User manual

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Warning It is the sole responsibility of the pilot to operate the aircraft in a safe manner, maintain full surveillance of all flying conditions at all times, and not become distracted by the Flymaster NAV . Flymaster Avionics is not responsible for any damages resulting from incorrect or no data provided by the Flymaster NAV . Flight safety is the sole responsibility of the pilot.

It is unsafe to operate the Flymaster NAV while in the air. Failure by the pilot equipped with a Flymaster NAV to pay full attention to the aircraft and flying conditions while flying could result in accident with property damage and/or personal injury.

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Chapter 1

Fully charge battery before using your Flymaster for the first time.

Figure 1.1: right view

The battery may be charged by either connecting the NAV USB connector to the wall socket charger or USB cable. USB connector can be found on the right side of the NAV (see figure 1.1).

1.1 Charging the Battery

Flymaster NAV has an advanced battery power management system, which gives the pilot accurate information about the battery state, as well as the charging time and battery remaining time.

To charge the Flymaster NAV battery you can use the wall charger, the USB cable, or the car charger. Original Flymaster accessories are recommended in order to avoid damage to the power management system.

The Flymaster NAV has 2 charging modes, namely, *Quick Charge* and *Slow charge*. The charging mode choice is automatic and based on the power source. *Quick charge* mode is activated when charging with the wall charger or the car charger, while Slow Charge mode is activated when a USB cable connected to a PC or MAC is used.

Charging, and battery status information is shown on both the power up screen and the *Shutdown* menu.

When the Flymaster NAV is connected to a power supply (wall charger or via USB cable), even with the unit off, the instrument will show if it is being *Slow* or *Fast* charged. The time remaining to full charge is also shown. This may not appear immediately a power source is connected since the instrument requires some time to calculate the remaining charge time required. A *Slow* charge is ok for topping up the battery but not for fully charging. Please use the wall or car charger to fully charge the instrument.

> Note: The instrument will not charge when it is turned on and connected to a PC. To charge the battery from a USB to PC connection the instrument must be turned off. This behavior is deliberate to prevent overwhelming competition organizer's download hubs.

Note: Charging the instrument with high ambient temperatures should be avoided, this will cause the battery to overheat which will halt the charging process, and has a can affect battery health.

1.2 NAV Keys

Four keys are used to interact with NAV (see Figure 1.2). In this manual we will call MENU key (S1), ENTER key (S2), UP key (S3), and DOWN key (S4). Each key has 2 functions depending on context, whether the device is in flight mode or in menu mode. Additionally the MENU key is used to *power-up* the NAV when it is switched off.

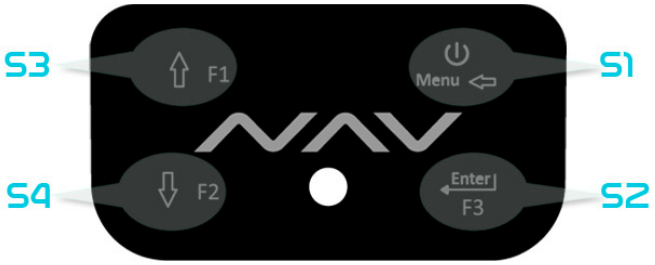

Figure 1.2: NAV keypad

In the flight mode Keys S2, S3 and S4 have user configurable functions F1, F2 and F3 that can allocated in the Menu->Settings->FS Keys (see Section 13.14). When a map object exists on a page FS Keys definition will be ignored and S3 and S4 will zoom in and out of the map whilst the S2 will switch page. In menu mode all keys have fixed functions shown by symbols on the keys namely S3=Up S4=Down, S2=Enter and S1=Back.

1.3 Using keys Inside Menu

Changing parameters on the NAV can be performed through the menu. Changing a parameter involves accessing the menu, selecting an option, and then changing a specific field value. Accessing the main menu can be done by pressing the MENU key in flight mode. Once in the menu, UP(S3), and DOWN(S4) keys can be used to scroll up and down through the menu options list. Once the desired option is selected, the option is highlighted, the ENTER(S2) key should be used to access the option. Depending on the menu option, a new menu options list, or a data fields list appears. Pressing the MENU(S1) key takes you back. When accessing data fields the associated menu option becomes *grayed* and the respective field data item is highlighted. Using the UP and DOWN keys changes the value on each field. When the correct value appears pushing the ENTER key moves to the next field, or in same cases to the next character/digit. Conversely, pushing MENU key moves to the previous field, or to the next character/digit. If the ENTER key is pushed on the last field all the data in the selection section is stored and control returns to the configuration menu. Inversely, if the MENU key is pushed on the first data field the changed settings are ignored and control is returned to the configuration menu. When setting a data field that involves setting several characters, e.g. when defining a waypoint name, after defining the desired characters, then pushing the ENTER key continually for more than 2 seconds will make the cursor jump to the next data field, or return to the configuration menu if no more data field needs to be set.

1.4 Switching NAV On and Off

To switch on the NAV , briefly push the S1 key (Menu Key). This will display the start up screen with a 10 second countdown . Pushing the S2 (Enter key) before the 10 seconds have elapsed will power up the NAV . The NAV initiates in flight mode. If the S2 key is not pushed within 10 seconds the NAV will go back to sleep. To switch off the NAV , push the S1(menu key) to activate menu mode, using the arrow keys (S3 or S4) scroll the cursor to the *Shutdown* item and push the S2(Enter Key).

1.5 Resetting the NAV

The reset procedure allows the pilot to restart the NAV in the unlikely event that it freezes, or stops responding, should this ever occur please report it to our support email. To reset the NAV push S1 (Menu key) and the S4 (Down arrow key) keys simultaneously for at least two seconds. Note that the S1 and S4 must be pushed at exactly the same time.

Chapter 2

Flight Mode

The Flymaster NAV has two main working modes, namely Flight mode, and Menu mode. Flight mode is used during flight, and this allows the user to see information such as Altitude, Speed, or Vario. The NAV can have up to 16 different pages (see Figure 2.1) in memory. Each page corresponds to a different screen, which can be completely configured by the user. A set of 16 pages is called a Layout. Once a Layout containing multiple pages has been defined, the user can switch page using one of the configurable function keys (see Section 13.14) in *Flight Mode*.

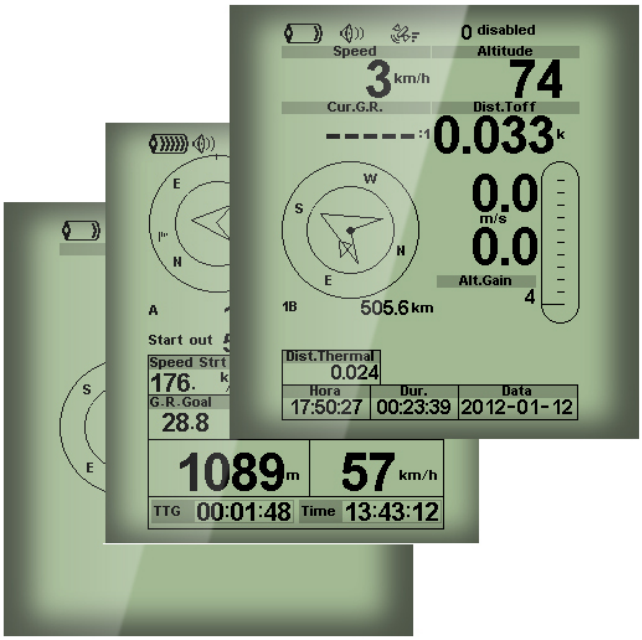

Figure 2.1: Layout page examples

Screen layout can be configured by the user using a free application, called *Flymaster Designer* which can be downloaded from the Flymaster website (www.flymaster.net). This intuitive tool allows the user to create an unlimited number of layouts, which can be saved to the computer, uploaded to the instrument, and even shared with other Flymaster users. See the Designer user manual, available on the website for more information about the Designer tool.

Designing a Layout consists of inserting a set of objects, called *Elements*, in the desired position, and with the desired dimensions, in each of the available 16 pages. The Designer works by *what you see is what you get*. This means that when you insert a element in a page, and after uploading the layout to the instrument, you will see exactly the same thing on the NAV screen.

There are several elements available for the NAV which are presented in the following section.

Chapter 3

NAV Elements

The main objective of an element is to provide information to the user. Elements can be Graphical, or Data Field type. Each element has its own properties which can be changed in order to alter the element behaviour, and/or shape.

3.1 Graphical Elements

Graphical elements are characterized by providing information in a graphical way. Most of the graphical elements have fixed dimensions, although their position can be altered.

As the NAV firmware evolves the list of Graphical Elements will likely grow. The current list includes the following graphical elements.

3.1.1 Battery

The Battery Element provides a graphical indication of the current battery level. In Table 3.1 it is possible to see the relationship between what is shown and the actual battery level in percentage. This element has fixed dimensions.

Table 3.1: Battery Element description

Symbol	Description
	Battery level above 90%
	Battery level between 70% and 89%
	Battery level between 50% and 69%
	Battery level between 30% and 49%
	Battery level between 15% and 29%
	Less than 15% battery remaining

3.1.2 Sound

The Sound Element provides graphical representation on the current volume level. Table 3.2 Shows the relationship between what is shown and the sound level. This element has fixed dimensions.

Table 3.2: Sound Element description

Symbol	*Description*
	Sound Level 6 (maximum sound level)
	Sound Level 5
	Sound Level 4
	Sound Level 3
	Sound Level 2
	Sound Level 1
	Sound is muted (No sound)

3.1.3 *GPS*

The *GPS* Element provides graphical indication about the current *GPS* signal quality. Basically, the lower the PDOP value (position dilution of precision), the more accurate calculations are for determining position . Values bellow 3,0 are fairly accurate. The relationship between what is shown and the signal quality can be seen in Table 3.3. Note that FAI rules require 3D tracklog

Table 3.3: GPS signal quality

Symbol	*Description*
	3D position with a PDOP bellow 1.5
	3D position with a PDOP between than 1.5 and 2.0
	3D position with a PDOP between than 2.0 and 3.0
	3D position with a PDOP greater than 3.0
	2D position (no altitude information)
	No GPS Signal

data, which includes *GPS altitude*. Therefore the NAV will only start recording a tracklog when 3D information is available. The NAV has an high sensitivity 50 channel GPS receiver which offers unmatched tracking performance in harsh signal environments (-160 dBm sensitivity), and very short acquisition times. The NAV has a 4 Hz GPS update rate (most of others only provide 1Hz) which allows the NAV pilot to see very small speed and position changes. Furthermore, the movement of the direction arrow is smoother and any position change is shown in a quarter of the time of other devices. Note that the 4 Hz update rate requires more than 5 satellites in view. More information about *GPS* accuracy and also other *GPS* related information can be seen in (http://www.kowoma.de/en/gps/errors.htm).

3.1.4 Vario

The Analog Vario Elements shows information regarding the analogue instantaneous vertical speed. There are four different Elements that can be used to display the vario. All of these element can be resized and re-positioned.

Analog Vario

This Element which can be resized and repositioned, graphically represents the rate of climb, scaled from 0 m/s to +/-10 m/s depending if you are climbing or sinking Figure 3.1.

Figure 3.1: Analog Vario

When the NAV detects that the pilot is climbing, a black bar starts to grow on the left, from the bottom of the scale to the top ,with 0,1 m/s increments. The same bar grows on the right, from the top of the scale to the bottom, if sinking is detected.

Big Analog Vario

The Big analog Vario element shows the instantaneous vertical speed (Figure 3.2). This element can be resized and re-positioned.

Figure 3.2: Big Analog Vario

This Element graphically represents the rate of climb, scaled from 0 m/s to +/-10 m/s depending if you are climbing or sinking. In this Element a black bar starts from the middle of the scale and grows at 0.1 m/s increments, up to 5 m/s at the top of the scale. When 5 m/s value is reached the black bar starts to disappear from 0 m/s (middle of the scale) until the top of the scale. When the bar completely disappears the climbing rate is equal, or above 10 m/s. The same process occurs when descending, but from the middle of the scale to the bottom.

Double Bar Analog Vario

The Double Bar Analog Vario element shows the instantaneous vertical speed (Figure 3.3). This element can be resized and re-positioned. In this Element the left side shows climb rates and the right side shows sink rates.

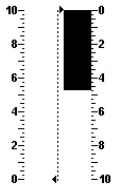

Figure 3.3: Double Bar Vario

Dial Analog Vario

The Dial Analogue Vario element shows the instantaneous vertical speed (Figure 3.4). This element can be resized and re-positioned. Climb or sink rates are shown by the position of the needle on the analogue dial. The maximum and minimum climb rates can be set using the DESIGNER software.

Figure 3.4: Dial Vario

3.1.5 Navigation Circle

The Navigation Element is a multi-information element which shows graphically the bearing, wind direction and thermal core. Additionally, if a destination was defined (waypoint) the navigation element will also indicates the direction to the waypoint center, the waypoint edge and the direction to the waypoint after the next one. This element cannot be resized but can be re-positioned.

For navigation information to be displayed the NAV must have a valid GPS fix.

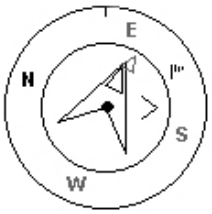

Figure 3.5: Navigation Element

Navigation information is shown within the inner most circles. The external circle contains the cardinal points. The current traveling direction (bearing) corresponds to the point indicated in the top of the navigation circle. On the example shown in Figure 3.5, the bearing is approximately 260^{o}.

Navigation Arrows

When a route is active the *direction of next optimal point* is pointed by an arrow(larger arrow). The *optimal point* corresponds to the unique point on the waypoint cylinder which lies along the optimal route (red route in the Figure 3.6 example). If no route is defined the arrow will start showing the direction to the takeoff, after the takeoff is detected, i.e. the average speed exceeds 5km/h.

During a competition task flight using the optimal tangent navigation saves a substantial amount of time. The smaller arrow closer to the centre of the navigation wheel points to the centre of next waypoint cylinder, and the arrow furthest away from the centre of the navigation wheel points to the optimised edge of the waypoint after the next one. The combination of all three arrows provides a spatial location of the waypoint.

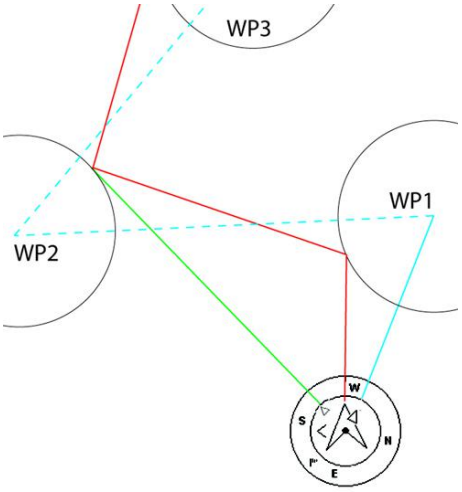

Figure 3.6: Route Optimisation

The example in Figure 3.6 shows a hypothetical task. A pilot navigating to the centre of the waypoint (following the small arrow) will probably be flying the blue course, whilst a pilot using the optimised route (red course) will fly the substantially shorter red route. The direction to the waypoint after the next one is shown by a small arrow on the outer part of the navigation wheel. In the example in Figure 3.6 this arrow is pointing along the green line, which shows the direction to WP2, even though WP1 has not been reached.

Small course corrections are sometimes required and these are shown on the NAV by a *fine adjustment indicator* in the form of a third small arrow.

An arrow to the left means the pilot should turn slightly to the left, and inversely an arrow to the right indicates a small adjustment to the right is needed. In the example of Figure 3.6 a very small arrow pointing to right indicates that the pilot should turn right slightly.

When the course is perfect, i.e. less than 1^{o} off, the NAV indicates this by showing a large arrow forward (Figure 3.7).

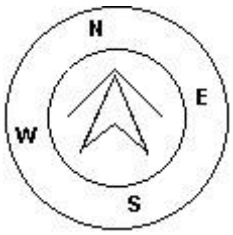

Figure 3.7: Perfect Heading

Note that, a start is automatically validated when a pilot correctly completes the start. Until the start is valid the NAV will not advance to the next point in the route. Another important aspect of the start is that the NAV does not point to the start cylinder but rather to the next turn

point on the list. The distance to the start will become highlighted when the pilot is in an irregular position, i.e. inside a start cylinder where he should be out or vice-versa.

Thermal Core Map

Another useful feature of the Navigation Circle Element is the thermal core map. This map corresponds to a black dot which is shown inside the inner navigation wheel (together with the navigation arrows).During a thermal climb the NAV keeps track of the strongest climb values point for each 50m layer. The point of strongest lift is then graphically represented by the black ball in the inner Navigation Circle, showing where the thermal core is relative to the pilot's position. The position of the dot (thermal core) is constantly updated as the pilot moves. When the pilot is over 300m from the thermal core the dot will be at the edge of the circle. As the pilot moves closer to the thermal core the dot will move towards the center.

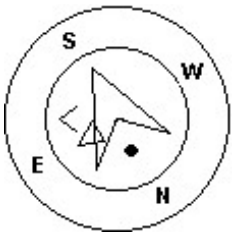

Figure 3.8: Thermap Core Map

In Figure 3.8 the thermal core is currently behind the pilot at a distance of approximately 150 meters (half of 300 m wheel radius).

3.1.6 Airspaces

The airspace element provides information to the user relative to specific three-dimensional objects of the atmosphere, previously loaded to the instrument. Each of this objects can be an airspace area. Airspace information can loaded to the instrument using the Flymaster Designer software (see Designer user manual for more information). The NAV only accepts data in the ?OpenAir? format, and it has a limitation of 3000 polygons points. (See http://www.gdal.org/ogr/drv_openair.html for more information about the open air format).

Figure 3.9: Airspace Element

When the element of Figure 3.9 is inserted in a layout using DESIGNER, a 2D map (box) is shown on the instrument. On the bottom left of the map the scale is indicated in Km, and on the centre of the map is an arrow (see Figure 3.10). This arrow represents the pilot position, and its orientation indicates the bearing of the movement. The map has always a *North Up* orientation. The first time the map is drawn, it is centred on the last GPS position the NAV has in its memory. The map is re-centred once the flight starts i.e. when a valid gps signal exists, and the *start speed* (see Section 13.5.6) is reached.

Once the flight starts, the map is redrawn with an arrow (representing the pilot) which will move around the map, indicating the relative position of the pilot to each of the airspace areas. If

the pilot is outside a visible airspace area then a gray line is used to draw the area, whereas if the pilot is inside the airspace then a black line is used instead. Note that being inside a airspace area (2D) does not mean that the airspace is being violated, since the pilot can be above, or below the defined 3D shape. In order to have more information about possible airspace?s violation, some data fields should be added to the layout. This data fields are Distance to CTR, Altitude to CTR, and CTR Status (Figure 3.10).

The Dist. CTR data field shows the shortest horizontal distance to the nearest airspace line. This distance is always positive. Similarly, the *Alt. To CTR* shows the shortest vertical distance to nearest airspace line. Unlike the horizontal distance, the vertical distance can be negative. A positive vertical distance indicates that you are outside the airspace, whereas a negative distance indicates that you are inside the airspace. Additionally, the *CTR status* field will indicate if an airspace is being violated by displaying *Violating*. If the pilot is not violating the airspace but it is inside a predefined margin then the messages *Altitude Imminent*, or *Position Imminent* will be shown.

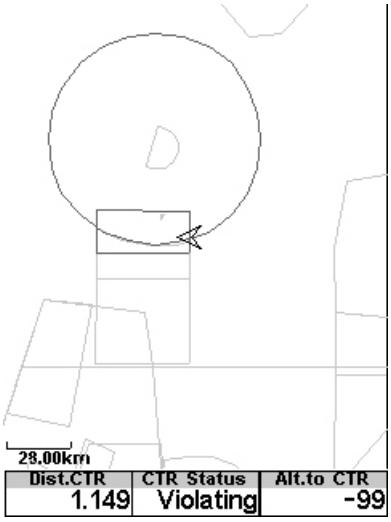

Figure 3.10: Airspace Map and Associated Data Fields

When the page contains an airspace map element, the UP, and DOWN keys, can be used to change the map scale: pressing the UP key will decrease the scale, and the DOWN key will increase the scale.

3.1.7 Altitude graph

The Altitude graph element (Figure 3.11) corresponds to a graph of altitude versus time. Altitude is shown in the vertical axis graduated in meters with time shown on the horizontal axis graduated in seconds.

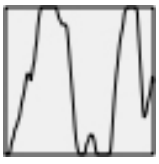

Figure 3.11: Altitude Graph Element

The range of the horizontal axis is fixed and corresponds to 240 seconds (4 minutes), while the

range of the vertical axis is automatically adjusted in order to accommodate the gained height. In reality the altitude graph element is a plot of the absolute altitude over the last 4 minutes of flight (Figure 3.12).

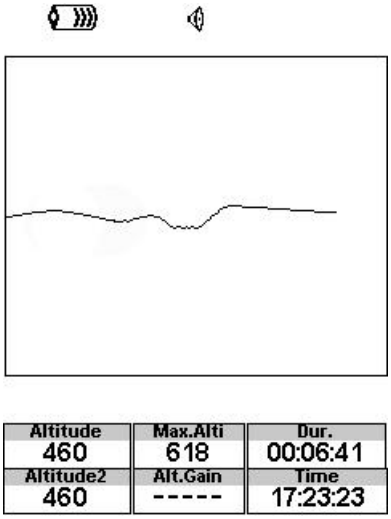

Figure 3.12: Altitude Plot

3.1.8 Wind Arrow

The *Wind Arrow* element (Figure 3.13) is a re-sizable graphical element.

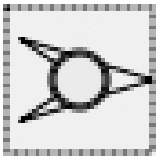

Figure 3.13: Wind Arrow Element

When used in a layout an arrow is draw showing the wind direction relative to the pilot direction (direction the wind is coming FROM). For example, if the pilot is facing the wind then the arrow points south (bottom of the screen). Centered over the arrow is a circle in which a number is displayed showing the wind speed in Km/h (Figure 3.14). The wind speed value can be also seen in a data field.

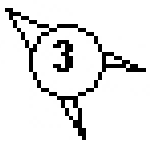

Figure 3.14: Wind Arrow

Note that both wind direction, and speed, are calculated based on the GPS ground speed while the pilot is turning, so there is no need of wind speed probe.

3.1.9 Map Page

The MAP element (Figure 3.15) provides information to the user about their position relative to waypoints, cylinder edges and the pilot's trace or track. This element can be resized and moved around the screen.

Figure 3.15: Map Element

A typical map page in flight may look like Figure. 20. In this figure is shown the scale on the bottom left. The scale can be manually changed by pressing the F1 button to enlarge the map and therefore reduce the scale, and conversely by pressing the F2 button to reduce the map and therefore increase the scale.

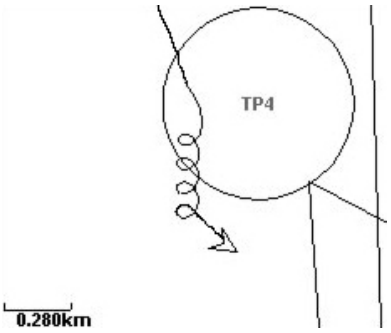

Figure 3.16: Map Page

If flying a competition route, the optimized route is drawn between the turnpoint cylinders. The position of the pilot is indicated by the arrow and the trace for the last approximately 4 mins of the flight is shown. Traces older than 4 mins are erased to reduce clutter on the screen.

3.2 Data field Elements

Data field elements can be used to shown numerical information like altitude, vertical speed, speed, glide ratio, and many others.

These elements have configurable size, and position, although the text within has only 3 possible sizes. Table 6 explains the available data fields. As the NAV firmware evolves this list will likely grow.

Table 3.4: Data fields Description

Field ID	Description
A.OverGoal	Altitude over goal is the difference between the current altitude and the goal's altitude based on barometric pressure values.
Above Toff	Altitude above takeoff is the altitude over the flight starting point.
Abs.Pressure	Absolute atmospheric pressure value in Pascals.
Active waypoint	Active turnpoint name.
AirTemp.	Air Temperature as measured by the wireless speed probe.
Alt.Gain	Altitude Gain. Altitude gained in current thermal.
Alt.Gain/Loss	Altitude Gain/Loss. When at the top of the thermal displays the altitude gained from the base of the thermal, else displays the altitude lost since reaching the top of thermal.
Alt.to CTR	Altitude to CTR shows altitude to controller airspace, a negative number indicates we must sink to come out of controlled airspace.
Altitude	Current altitude. This altitude is calculated based on the barometric pressure and depends on the QNH value.
Altitude2	Second Altimeter which can be set independently to the main altimeter.
Arrival Goal	Estimated arrival height above Goal. The height is calculated considering the average glide ratio that has being made. This means that wind, day quality and glider performance are used in the calculations.
Arrival Next	Estimated arrival height above the next waypoint. This means that wind, day quality and glider performance are used in the calculations.
Ave.Speed	Average ground speed calculated using a filter to show a smoothed speed, eliminating erratic speed changes due to glider pitching, etc.
Ave.Vario	Average Vario calculated using an integration time constant in order to indicate smoother climbing rates.
AveROT	Average rate of turn in degrees per second.
Battery	Shows battery strength as a percentage of complete charge
Bearing	Current bearing in degrees.
CTR Name	Name of the airspace causing warning or violation.
CTR Status	Status message of airspace, will show *Violating* when in controlled airspace, *Immenent Alt* when close to entering airspace vertically or *Pos.Immenent* when close to entering airspace horizontally.
Cur.G.R.	Current glide ratio calculated using the average vario value, and average ground speed.
Date	Current date. This value is automatic set when the device gets a valid GPS Signal

Continued on next page

Table 3.4– continued from previous page

Field ID	Description
Dist.CTR	Distance to controlled airspace. When more than one airspace area is in range the closest will be shown. When inside an airspace area the distance shown is to the closest edge.
Dist.Edge	Distance to Edge. Shortest distance to the optimal point of the next waypoint using route optimisation.
Dist.Goal	Distance to goal is the total distance from the current position to the goal. The distance is calculated considering that the optimal route is made through all pending turnpoints.
Dist.Line	Distance to Line. Shortest distance to the waypoint line circle. Distance line corresponds to the Distance Next minus the waypoint radius.
Dist.Next	Distance to Next. Shortest distance to the waypoint center. Distance next corresponds to the Distance Line plus the waypoint radius.
Dist.Start	Distance to start. Shortest distance to the start cylinder.
Dist.Thermal	Shortest distance to last thermal core (thermal dot).
Dist.Toff	Distance to take off is the distance between the current point and the flight starting point.
Dur.	Flight Duration. Duration of the current flight.
Flight Level	Current altitude in hundreds of feet, based on a fixed QNH of 1013.25hPa.
Fuel	Fuel level in liters (available when connected with Flymaster M1).
G-Force	Current G-Force being experienced by the pilot when using the Heart-G sensor.
Goal Close	Remaining time to goal close.
GPS Alti	Altitude reported by the GPS.
G.R.Goal	Glide ratio to goal. Necessary glide ratio to reach the Goal considering that the optimal route trough remainng waypoints is made.
G.R.M.G.	Glide ratio made good. The actual glide ratio towards the active turn point. It is calculated using the integrated vario, and the VMG.
G.R.Next	Glide Ratio to Next. Necessary glide ratio to reach the next turn point.
G.R.Toff	Glide ratio to takeoff. Necessary glide ratio to reach the take off.
Heading	Heading in degrees returned by GPS.
Int.Temperature	Temperature inside the instrument.
Land In	During competition tasks it is common, usually due to safety reasons, to have a *land by* time. The land by time is defined by adding a waypoint typically the goal to the already defined task, setting it as *Landing* and defining the time. *Land in* shows the amount of time remaining before having to be on the ground.
Latitude	Current position latitude according to the format defined in the settings menu.
Longitude	Current position longitude according to the format defined in the settings menu.
Max.Alti	Maximum altitude reached during current flight. This is based on barometric altitude.

Continued on next page

Table 3.4– continued from previous page

Field ID	Description
Max.Climb	Once a flight has started, it shows the maximum rate of climb encountered during the flight. This value uses the integrated vario not the instantaneous rate of climb. This provides good indication of the quality of the day's thermals. This value is reset when the instrument is switched off.
Max.Sink	Once a flight has started shows the maximum sink encountered during the flight. Note that these values are using the integrated vario. When the instrument is switched off this value is reset back to zero.
Max.Speed	Maximum Speed (returned by GPS) reached during the flight. When the instrument is switched off this value is reset back to zero.
MotorTemp	Motor Temperature (available when connected with Flymaster M1).
Page Num.	Current layout active page number.
Pulse	Current heartbeat in beats per minute, when using the Flymaster Heart-G sensor.
RPM	Motor revolutions per minute (available when connected with Flymaster M1).
Speed	Indicates ground speed. The speed is only available when the GPS receiver has a valid signal.
Speed Strt	Speed to Start. The speed at which the pilot must fly in order to reach the start gate exactly at its opening.
TAS	True Air Speed. This information is available when the instrument is used in conjunction with the Flymaster TAS pitot probe.
Therm.Dur.	Time pilot has spent in the most recent thermal.
Thermal top	The highest point reached during the current thermal.
Thrml.Perfo.	Perfomance of the most recent thermal showing average rate of climb in most recent thermal.
Time	Current local Time. This value is automatic revised when the device gets a valid Gps Signal. (see Note 2)
Trans.G.R.	Glide ratio during transition. Average glide ratio during transitions between thermals.
TTG	The TTG field is dynamic and will vary according to the current flight status and type of task defined. It will show TTG (time to go) before start gate opening, and will then change to *SS* (Speed Section time) which is the time elapsed after the opening of the start. If no start gates are defined in the task, or no task is defined, then this field will show *Dur*, which in this case is the time elapsed since takeoff. The takeoff event is triggered when ground speed exceeds 5km/h and a 3D fix is available.
Turnpoint size	Radius of the active turnpoint.
Steps	Number of steps taken since counting initiated.
Steps/Min	Cadence showing number of steps per minute.
Vario	Instant vario value.
VMG	Velocity made good, is the speed at which the pilot is approaching the active turn point.
Voltage	Current battery level in Volts.

Continued on next page

Table 3.4– continued from previous page

Field ID	Description
Wind Dir.	Wind direction in degrees, calculated from gps when drifting.
Wind Speed	Calculated wind speed using gps speed.
UDF 1	User defined field 1. The data shown can be user defined.
UDF 2	User defined field 2. The data shown can be user defined.
UDF 3	User defined field 3. The data shown can be user defined.
UDF 4	User defined field 4. The data shown can be user defined.
UDF 5	User defined field 5. The data shown can be user defined.
UDF 6	User defined field 6. The data shown can be user defined.
Ceiling	Shows the upper altitude of the airspace causing the warning, i.e. airspace that you are violating or close to violating.
Floor	Shows the lower altitude of the airspace causing the warning, i.e. airspace that you are violating or close to violating.

Note 1- The NAV considers a thermal has been entered when the integrated vario value is above 0.5m/s and considers the thermal as been exited when the integrated vario goes bellow -1.0 m/s. Once in the thermal the Gain indicator will keep track of the maximum altitude reached in the thermal. If the altitude is less than the the max thermal altitude then a negative number will show the difference from the highest point reached. If the altitude is equal or higher than the maximum reached then a positive number will show the altitude gained since entering the thermal. The Gain indicator keeps track of how much altitude is being gained in the thermal. When a pilot enters a thermal the NAV will reset the Gain indicator to 0 and will start to track how much altitude the pilot has gained. At a certain point in the thermal the lift may become weaker and inconsistent. At this point the gain indicator will show altitude loss in this inconsistency. Once the pilot climbs in the thermal again the indicator will show the gain since entering the thermal.

Note 2- All the internal NAV time calculations are based on UTC (Coordinated Universal Time). This is also the time saved on the track-log. However, the time displayed in the time field is calculated adding an UTC offset to the UTC time obtained from the GPS receiver. The *UTC offset* should be defined in the settings menu (see Section 13.2.3) so that the correct local time is displayed.
Note 3- The TTG field is dynamic and will vary according to the current flight status and type of task defined. It will show TTG (time to go) before start gate opening, and will then change to *SS* (Speed Section time) which is the time elapsed after the opening of the start. If no start gates are defined in the task, or no task is defined, then this field will show *Dur*, which in this case is the time elapsed since takeoff. The takeoff event is triggered when ground speed exceeds 5km/h and a 3D fix is available.

Note 4- The *Altitude* field indicates the absolute height in meters or feet depending on the setting. This altitude corresponds to the barometric altitude and thus depends totally on the QNH (absolute pressure at a given moment and location in regards to the correspondent pressure at MSL).

The altimeter cannot be reset, but can be set using the corresponding menu option (see Section 13.1).

Chapter 4

Menu mode

When in flight mode, pushing the menu (S1) button accesses the menu mode. When in menu mode pushing the menu(S1) button will go back to flight mode.

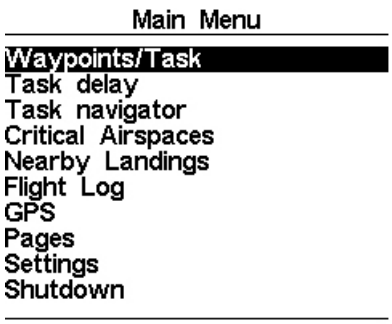

Figure 4.1: Main Menu

To access the different items on the menu you can use the UP(S3) and DOWN(S4) keys. Once a menu item is selected pushing the ENTER (S2) executes the selected function. A short description of each option can be seen in Table 4.1.

Table 4.1: Main Menu Options

Menu item	Description
Waypoints/Task	Accesses NAV 's waypoints and Taskdefinitions. (see Chapter 5)
Task delay	Shifts all time parameters in the active task. (see Chapter 6)
TaskNavigator	Allows manual override of navigation. (see Chapter 7)
Near Landings	Displays airfields page. This page constantly shows the glide ratios, and distances to the nearest landing fields, sorted by easiest glide. (see Chapter 9)
Flight log	Accesses the stored flights list. (see Chapter 10)
GPS	Displays detailed GPS status and allows GPS module reset. (see Chapter 11)
Pages	Accesses different layout pages. (see Chapter 12)
Settings	Accesses the Settings sub menu. (see Chapter 13)
Shutdown	Switches off the NAV , and displays detailed battery status.

Chapter 5

Waypoints and Task

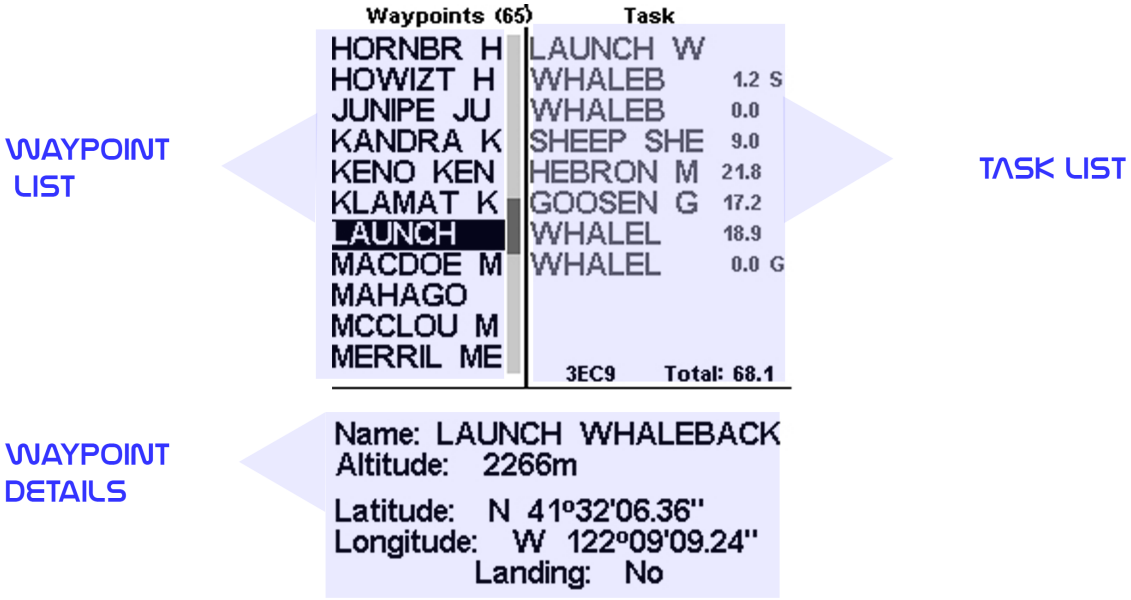

Figure 5.1: Waypoints and TaskScreen

The Waypoints/Taskpage allows the user to manage waypoints, and define a route/task. As shown in Figure 5.1, the page is divided into 3 areas, namely the waypoint list (WL); Task list (TK) and selected waypoint details/options list (DO). The DO area can change according to which submenu you are in. Specifically, it can show the selected waypoint data, or a list with possible actions for the waypoints.

Entering the page activates the WL area. At the top of the page next to the title Waypoints, is the total number of Waypoints stored in the NAV instrument. [1] The first waypoint on the list appears highlighted, and the corresponding data of the selected waypoint is shown in the DO area. As the cursor is moved to a different waypoint so the data changes matching the newly selected waypoint. If the waypoints list is empty a list of available actions is shown in the DO area. Since no waypoint exists only the *Insert new Waypoint* action is available.

Pushing the ENTER key when a waypoint is selected activates the waypoint actions menu (WAM). A list with the available actions is shown in the DO area.

[1] The NAV can store up to 442 waypoints.

5.1 Waypoints Actions Menu

On entering the waypoint actions menu (WAM) the selected waypoint becomes grayed indicating that waypoint specific actions will be carried out using the selected waypoint. Once the WAM is active a list of options appears in the DO area. A short description of each option is show in Table 5.1.

Table 5.1: Waypoint Menu Options

Action	Description
Add WP to Task	Adds the selected waypoint to the end of the task.
Insert New WP	Starts a new waypoint entry. The current location is automatically used for default waypoint data.
Edit WP	Start editing the selected waypoint.
Delete WP	Delete the selected waypoint. If the waypoint is being used in the task this option is disabled.
Delete all waypoints	Deletes all waypoints and task.
Go to Point	Forces navigation to the selected waypoint. This overrides the task navigation.
Edit Task	Starts editing task. If no waypoints have been added to the task this option is disabled.

5.1.1 Add Waypoint to Route

To add a waypoint to the task, select the waypoint that is to be added by pressing either the UP or DOWN buttons until the desired waypoint is reached. Pressing the ENTER button will add the point onto the TL on the right, at this moment the task point options for the newly added waypoint will appear in the DO area, allowing to set several aspects of the task point (these can also be edited later).

5.1.2 Insert New Waypoint

This menu allows the user to add a new waypoint to the waypoint list. The co-ordinates and altitude used for the waypoint are based on the current position.

5.1.3 Edit Waypoint

Entering this menu allows any of the characters of the selected waypoint to be changed. The name of the waypoint can be changed, along with the elevation, lattitude, longitude and if the waypoint is to be designated as a landing field. To change any of the properties of the waypoint, first select the waypoint to changed. Pressing S2 pulls up the menu allowing the waypoint to be edited. Pressing the S2 button again will show a cursor as shown in Figure 5.2, indicating the character to edited.

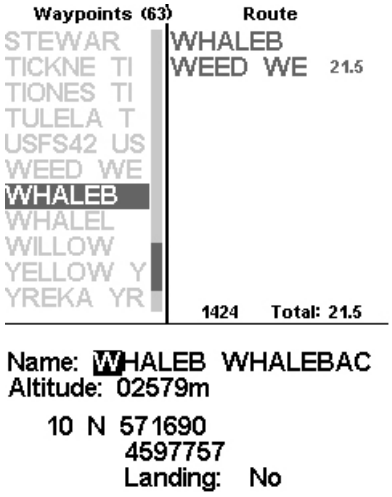

Figure 5.2: Edit Waypoint

The waypoint may also be configured as a *Landing*, these waypoint will then be displayed in the Nearby Landings.

5.1.4 Delete Waypoint

It is possible to delete just a single waypoint on the NAV . Select the waypoint to be deleted by pressing either the S3 or S4 buttons. Once the waypoint is highlighted, selecting *Delete Waypoint* will remove the waypoint from the NAV memory. If a waypoint is in use int the Task the delete function will be disabled, to delete the Waypoint it must firstly be removed from the Task.

5.1.5 Delete All Waypoints

All of the waypoints can be removed from the NAV . Delete all the waypoints will also delete the Task. When selecting this option the NAV will prompt to ensure that this is exactly what is intended. WARNING: Do not confuse this function will *Delete Task*, the last think you want is to be sitting on takeoff with no waypoints in the NAV , to clear the previous task use the *Delete Task* function described in section Section 5.2.4.

5.1.6 Go To Point

Selecting the *Go To Point* will force navigation to the selected waypoint. Once selected (by pressing the ENTER button), the instrument will jump to the *flight screen* automatically navigate to that point. When returning to the Waypoints/Task will cancel the active *Go To*.

The *Go To* function will override the task navigation, although the NAV will remember where it was in the task, so when the *Go To* is canceled (as described above) it will resume the task at the point it was at before the *Go To* was activated.

5.2 Edit Task

The NAV will only store one route. This is deliberate to prevent flying an incorrect task.

A task can be edited by selecting the *Edit Task* option of the *Waypoint Action Menu*. Selecting the *Edit Task* option will highlight the first Task/Route point in the TL area. Pushing the UP

or DOWN buttons will move between the Task points. For the highlighted *task point*, the bottom screen area will display the *task point* parameters.

When a task has only one point it is considered as a *Go To* type route. The NAV will automatically start navigating to that point.

When the task contains more than one point then the first turn point will automatically be set as *Take-Off*. The *Take-off* is ignored for navigation proposes and is only used for calculating the total task distance.

Each *task point* defined has a particular type, by default it will be set to Cylinder (see Table 5.2 for a description of the various task point types).

Pushing ENTER while on a selected task point will open a *Task Point Menu* (at the bottom of the screen in the DO area), which will allow you to *Edit*, *Move* or *Remove* a task point from the task.

Table 5.2: Task point types

Type	Navigation
Take off	This first task waypoint is automatic defined as Take-Off. This waypoint, however, is only a place marker for calculating the entire task length. The NAV will ignore it for navigation purposes.
Cylinder	The cylinder type is defined by a coordinate and a radius. The coordinate is taken from the chosen waypoint and the radius can be defined by the user. The default value (usually 400m) for the radius is defined in the Turnpoint Size settings. During navigation, NAV will advance to the next task waypoint once the pilot transitions over the cylinder line.
Start In/Exit	Start In route waypoints are start gates, sometimes also known as *Exit start*. NAV will only validate the waypoint, and advance to the next waypoint on the route, if the user is inside the set radius after the start time. Note that the sequence in which this waypoint appears in the task list in very important (see Note 5).
Start Out/Enter	Start Out is the most commonly used start gate, sometimes also known as an *Entry start*. NAV will only validate this waypoint, and advance to the next waypoint, when the user is outside the radius after the start time. Note that the sequence in which this waypoint appears in the task list in very important (see Note 5).
Goal Cylinder	The goal cylinder is very similar to the Cylinder, expect for the fact that it has a *Closing Time*. The closing time is used to calculate the Goal Close user defined field.

Continued on next page

[1] *Warning:* Whenever a modification if done to the task, navigation will be restarted at the beginning of the route. In this can you can use the Task Navigator to force the navigation from a desired waypoint (see Chapter 7).

Table 5.2– continued from previous page

Type	Navigation
Goal Line	A goal line is defined as a line, with a specific length and centered in a coordinate. By definition the line is perpendicular to the direction taken from the previous task waypoint to it. Due to safety reasons it is common to have competition tasks that include a Goal Cylinder used for measuring time (end of speed section) followed by a line, or another cylinder, which must be crossed. In this type of task, the Goal waypoint should be inserted twice, being the first one set as a Goal Cylinder, and the second one as Goal Cylinder, or Goal Line. The End of Speed Section will occur once the first goal is reached. A Goal Line with length of 400m will extend 200m either side of the centre of the co-ordinate that is designated as a goal line.
Landing	Most of the times landings can take place at the Goal. In this case the Goal point may be inserted again which allows the definition of a Landing limit time. The NAV will then use this limit to calculate the *Land In* data field. On some occasions, for safety reasons, landing is recommended to be elsewhere, so a different waypoint may be used.

When the NAV validates a turnpoint it emits a audible notice informing the user that navigation has advanced to the next waypoint, this audible notice can be disabled in the Turnpoint Complete in the Alerts setting (see Section 13.4.1). by changing the can be changed.

5.2.1 Edit route point

When *task points* are added to the task by default their type with be Cylinder and have a 400m radius, (except for the first one, as mentioned above, which is set as *Take-off*). [2]

To modify a particular *task point*, select the task point using the UP or DOWN buttons, then push ENTER to open the Task Point Menu, then select the *Edit Route Point* and push ENTER.

The task point parameters can now be edited. Changing the *task point type* will cause the *Time* field to be displayed when applicable.

Very important: The sequence in which the waypoints are listed is critical since the NAV will navigate them in that order, so in the case of a start gate which is also a turn point (as is commonly used in competition tasks) the start must be placed before the turn point.

The *Time* is only available on turn point types that are time related, so the *Time* field will only be visible when the turn point type requires a time (e.g. Start gates and goals). Table 5.3 describes how *Time* data is used for each field type.

Table 5.3: Task time types

Type	Time field
Take off	No time field.
Cylinder	No time field.

Continued on next page

[2] The default radius can be modified (see Section 13.15.2).

Table 5.3– continued from previous page

Type	Navigation
Start out or Start in	The time at which the start opens. The start is only validated when the pilot crosses the perimeter line at a time later than the defined time. The TTG (time to go) will show how much time remains to the opening of the start, i.e the difference between this field's value and the local time of day. Navigation to next point will only continue after the validation of the start.
Goal Cylinder or Goal Line	Time of goal close. The *Goal Close* configurable data field displays how much time is left until the close of the goal.
End Speed Section	This waypoint type defines the end of the speed section in the task
Landing	Time of compulsory landing. The time will be used to calculate the *Land In* user defined field.

5.2.2 Move Route Point

The order of a task point can be easily changed. To change the order simply select the waypoint using the UP, and DOWN buttons. Push the ENTER button to activate the actions menu list. Then select the *Move Route Point* option, and push ENTER button. A cursor will be shown next to the selected waypoint. Using the UP and DOWN buttons move the task point to the desired position and push ENTER.[1]

5.2.3 Remove Route Point

To remove a task point select it using UP, and DOWN buttons, and then pushing the ENTER button to activate the Task Point Menu, chose the *Remove Route Point* option and push ENTER to remove it from the list.

5.2.4 Delete Task

Delete route will delete the entire route. On any waypoint push the ENTER button to activate the actions menu list. Select the *Delete Route* option from the menu, and push the ENTER button to confirm. The route will be deleted and the WL area activated.

5.2.5 View Task

Entering the task view menu shows the task along with the optimised route as shown in Figure 5.3. This view has a number of important features displayed. The start time is shown in TP1 and the optimised route is shown by following the sequential waypoints. The size of the cylinders is also shown along with a scale at the bottom left of the screen. The total optimised distance for the task is show at the top of the screen. Since this is optimised distance it will be less than the distance shown in the *Task List*.

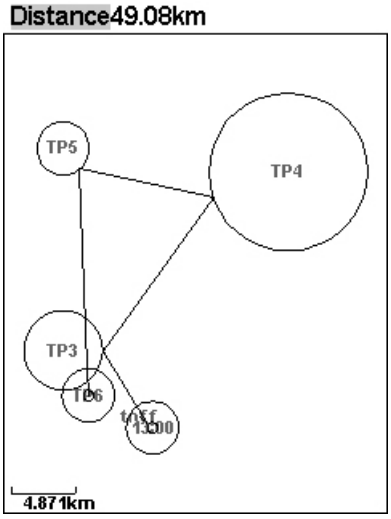

Figure 5.3: Task View

5.3 Task Definition

Consider the task represented in Figure 5.3, and detailed in Table 5.4.

Table 5.4: Task example

Cylinder type	Time	Waypoint name	Map name	Cylinder size
LAUNCH	12:00:00 PM	LAUNCH	toff	
START	01:00:00 PM	WHALEB	TP1	2 km
CYLINDER		WHALEB	TP2	400 m
CYLINDER		SHEEP	TP3	3 km
CYLINDER		HEBRON	TP4	6 km
CYLINDER		GOOSEN	TP5	2 km
END OF SPEED SECTION		WHALEL	TP6	2 km
GOAL	05:00:00 PM	WHALEL	TP6	400m

5.3.1 Setting up the task

Start by deleting any existing task on the NAV (see Section 5.2.4). Then, add to the task, in the right order *LAUNCH*, *WHALEB* twice, *SHEEP*, *HEBRON*, *GOOSEN*, and finally *WHALEL* twice. The NAV will automatically assume *LAUNCH* as the takeoff since it is the first waypoint on the list. The first *WHALEB* will be used as Start, and the last *WHALEL* will be used to define the landing deadline. The completed task should look like Figure 5.4.

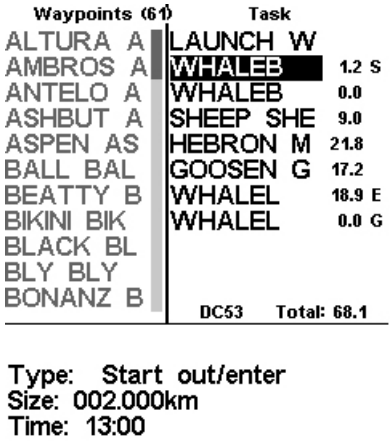

Figure 5.4: Task example

As waypoints are entered their properties can be edited as you enter each waypoint, On the task list, select the first occurrence of *WHALEB* and edit it. Change the waypoint type to *Start Out*, set the distance to 2.000km, and the start time to 13:00. (Note that all times are in the 24 hour clock). Beware, that it is very important that the first occurrence of *WHALEB* be set as *Start*, otherwise the NAV will assume that *WHALEB* needs to be completed before the start gate, and that is not what is required for this task. Nothing needs to be changed for the second occurrence of *WHALEB* since the default values are the ones wanted. Regarding the Goal, edit the first occurrence of *WHALEL* and change its type to *End of Speed Section*. For the second occurrence change the type to *GOAL* remembering that the radius does not need to be changed since the radius is by default 400m. Continuously pressing the ENTER bottom will make the cursor jump to the next parameter which is the time. Time should be set to 17:00 which is the goal close time. Upon completion of editing the task, the task list will show the distances for each leg, and the start gate will be shown with an *S*, end of speed section is shown with an *E* and the goal shown with a *G*.

Progressing through the above procedure sets the task on the instrument. Going back into the *Flight Mode Screen*, by pressing MENU bottom will automatically activate the task and start navigation.

Chapter 6

Task Delay

During competitions it is common that the tasks gets postponed or delayed. Usually the take off, the start gate, goal close and land by times are all postponed or delayed. Instead of having to edit the defined task, the NAV offers a task delay feature which moves all defined times in a task forward by X minutes.

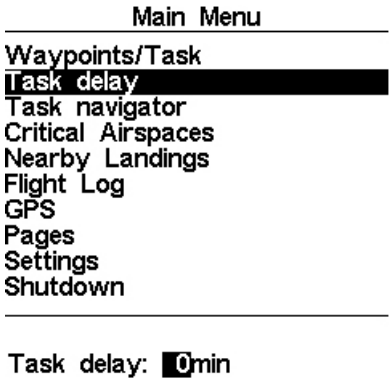

Figure 6.1: Task Delay

To delay a task, when in the *Task Delay* menu simply push the ENTER button when the *Task Delay* is selected (Figure 6.1). Then using UP, and DOWN buttons set the number of minutes to delay. Finally, push the ENTER button to confirm.

Chapter 7

Task Navigator

This function is useful to override the automatic task navigation provided by the NAV , and should only be used if for some reason a mistake was made during the creation of the task.

When this option is selected the NAV displays the task list. Using the UP and DOWN buttons the desired waypoint can be selected. Pressing the ENTER button will cause navigation to be resumed to the selected waypoint. Route navigation will then continue in the sequence displayed in the task menu.

Figure 7.1: Task Navigator

When entering into the Task Navigator menu, all of the route points are shown as both the short name and long name (Figure 7.1). Selecting any of the routepoints will show a navigation wheel in the lower part of the screen showing the direction to that point along with the distance to the waypoint cylinder. The distance shown is the Distance to Line, which is the closest point on the cylinder to where the pilot is. This is not necessarily the optimum point on the cylinder.

The *Start* waypoint will be grayed since it is not possible to navigate to a start. Pressing the menu button will get you back to the flight screen without any change to the navigation.

Note that an override to the navigation will assume that the start has been done.

Chapter 8

Critical Airspaces

Critical airspace shows a list of airspaces within 100km of the pilot's position. This list is generated when in flight mode and is ordered by the sequence in which the airspace appears in the file used to create the airspace. Other airspaces may be loaded in the airspace internal database and not displayed in this list since they are more than 100km from the pilot's position.

If the pilot moves by more than 30 km from the original position, the list of critical airspaces is reloaded from the airspace internal database based on the new position of the pilot.

A typical list of airspace may look like Figure 8.1. Note that the number in parentheses indicates the number of airspace polygons loaded into the instrument.

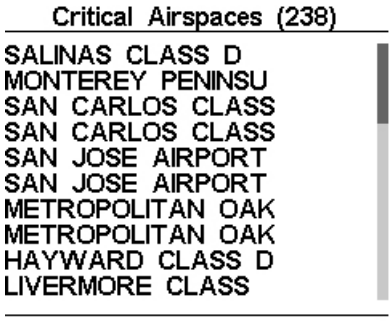

Figure 8.1: Critical Airspace

On selecting enter, the lower field is populated with key data (Figure 8.2). This list shows:

- the Distance to the CTR if within the threshold (see Section 13.16),
- the Altitude which is the reference altitude for the airspace (see Section 13.16),
- the floor of the airspace which is the lowest altitude of the airspace,
- the ceiling which is the maximum altitude of the airspace.

The list also shows if the pilot is violating airspace, violation imminent or out of airspace. The reference altitude is the current altitude being used for airspace calculation. Different reference altitudes can be set in the Airspace settings (section 15.15 Airspace settings) and these include Altitude (barometric altitude), GPS altitude and Flight Level (using 1013.25 mBar pressure). For more details on this see Section 13.16 Airspace settings.

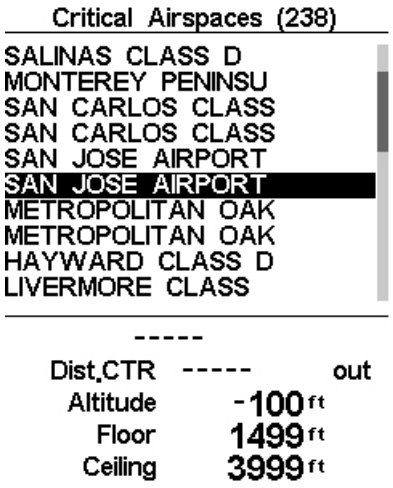

Figure 8.2: Critical Airspace Data

Chapter 9

Nearby Landings

It is possible to define waypoints as *Landing*, allowing the pilot to quickly check for landing options.

The Near Landings page will show all the waypoints (defined as *Landings*) for which the necessary glide ratio is finite. Additionally for each waypoint the distance and glide ratio is also shown, this list is sorted by glide ratio in ascending order (see Figure 9.1).

The near landings page can be accessed directly from the Flight Mode screen, by using a short cut function key (see section Section 13.14).

In order to define a waypoint as a landing the *Landing* parameter should be set to *Yes* in the waypoint edit screen (see Section 5.1.3).

The Near Landings page can be used to make a *Go To* by using the UP, and DOWN buttons to select the desired waypoint. Pushing the ENTER button will immediately activate navigation to the selected waypoint.

On the example of Figure 9.1 the closest airfield is 12.48 Km from our present location, and the necessary glide ratio to reach it is 9.6.

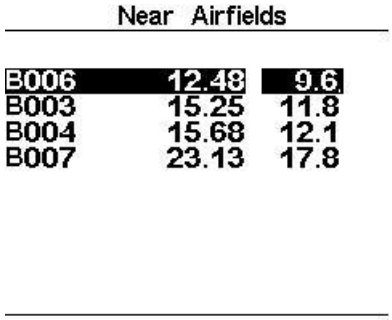

Figure 9.1: Nearby Landings

Chapter 10

Flight Log

The Flight Log option allows the user to access information about previous saved flights (Figure 10.1). The top half of the screen lists flights stored in memory. Each flight is identified by the take off date, time and flight duration.

Figure 10.1: Flight log

Flights can be selected using UP and DOWN keys. For the selected flight additional information is displayed on the bottom half of the screen:

- Max. Altitude - Maximum altitude during flight (ASL).
- T.off Alti. - Take off altitude.
- Above Toff- Altitude above take off
- Max. Sink - Maximum sinking rate during flight
- Max Climb - Maximum climbing rate during flight
- Distance - Distance flown and if goal was made
- Speed Sec - Time to cover the speed section of the task

Pushing the ENTER key will display the Flight Log Action List, with options:

- Delete Flight
- Delete all flights

Also if you use a flight data download application and request the flight list while the Flight Log Action is active only selected flight will be reported to the downloader application, this is useful at competitions to ensure the scorer downloads the correct flight.

10.1 Delete Flight

Similarly, selecting the *Delete Flight* option will delete the selected flight from memory. Before deleting the flight, a message is displayed asking the user to confirm the action (Figure 10.2).

Figure 10.2: Delete Flight

10.2 Delete All Flights

All of the flights in the NAV can be deleted by selecting the *Delete all flights* option. A message is displayed asking the user to confirm the action of deleting all flights (Figure 10.3).

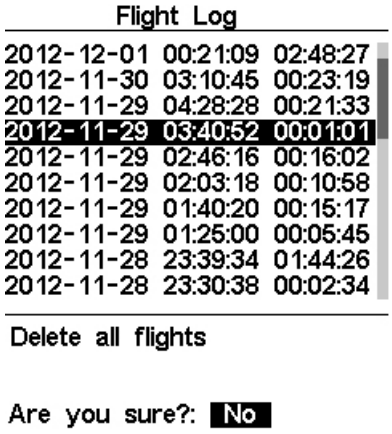

Figure 10.3: Delete all flights

WARNING: Deleting all flights will completely erase the flight log memory, all track logs will permanently erased.

10.3 Memory capacity

The current firmware version it can store up to 131000 points, which equates to over 36 hours with a 1 second recording interval (obviously if you set it to a 10 second recording interval you get 360 hours). See Section 13.2.2 on how to change the interval.

Also important to understand is how the data is organised, there are 256 blocks of data which can handle 510 points each, as a flight grows it takes up these blocks, so each flight will occupy a multiple of 510 points, at an extreme example if you have 256 flights each with 1 second the memory will be full, and you only have 256 seconds of flight data (this is obviously not a realistic scenario).

Chapter 11

GPS status

In the main menu the NAV provides a detailed view of the *GPS* status,the current *position dilution of precision* (pdop) value ,and the current *GPS* coordinates of the pilot.

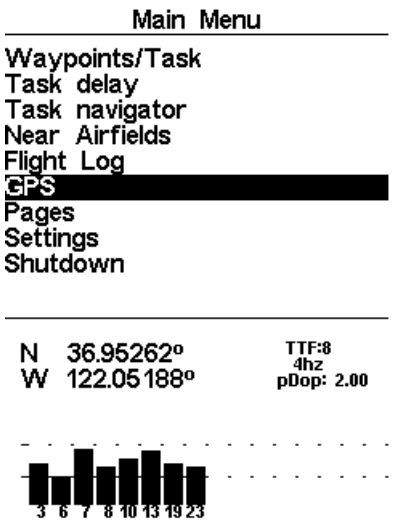

Figure 11.1: Satellite status

Figure 11.1 illustrates the *GPS* satellite reception page. In this example the NAV shows that 8 satellites are visible, and all 8 are being used to provide the position fix. Each bar shows the signal strength for each individual satellite. A filled bar indicates the NAV has a *lock* on that satellite. The *position dilution of precision* (pdop) shown gives an indication of how reliable the *GPS* altitude is at the moment. The lower the pdop value the more accurate the position fix. Values bellow 2.5 are fairly accurate. If the NAV is switched on in a location where no satellites are visible (indoors for example) it will go into wide search mode. If this occurs, going outdoors again will make the NAV take an increased amount of time to pick up satellite signals. If this occurs pushing ?enter? on the *GPS* menu item will reveal the *Reset GPS* option, changing it to yes will make the NAV reset the *GPS* status and start a new search. So if you notice NAV is taking abnormally long to get a fix (over 2 minutes) a *gps reset* will probably get it locked quicker (see Figure 11.1).

Chapter 12

Pages

The Pages Menu shows a list of the different pages as defined in DESIGNER, that are available on the NAV . Figure 12.1 shows an example of what is available in a typical layout in the Pages Menu (this will be different depending on what was configured from the Designer).

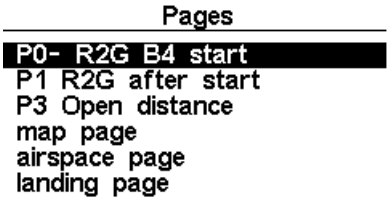

Figure 12.1: Available Pages example

You can select different pages by selecting either the UP or DOWN keys (F1 and F2 respectively). If you press ENTER for that page, 2 options become available for each of those pages as shown in Figure 12.2.

Figure 12.2: Page Options

Selecting the *Goto Page* option and pressing the ENTER button will jump to that page on the *Flight Screen*. This allows the user to display any of the pages without having to resort to trigger

functions to display that particular page or having to scroll through all of the pages in sequence using the F3 button (if that option is set). It is also possible to disable a page so that when you toggle through the different pages using F3, that page is displayed, Figure 12.3. Also all triggers associated with the disable page will be ignored.

Figure 12.3: Disable Page

Once a page is disabled, an asterisk will be shown on the list prior to the name indicating it is disabled as shown in Figure 12.4 (in this case *P1 R2G after start* is disabled).

Figure 12.4: Enable Page

Note that on Figure 12.4 when selecting and pushing ENTER the *Goto Page* option is not active and the focus will be on the *Enable Page*, pressing ENTER will re-enable the page.

Chapter 13

Settings menu

The settings menu (Figure 13.1) is used to configure the NAV 's many features. The menu is divided into two sections, the menu option and the associated configurable fields.

To use the configuration menu, select the desired option by using the arrow keys (UP and DOWN), then push the ENTER key to edit the fields.

Figure 13.1: Settings Menu

Note that on the right hand side of the display is a scroll bar showing where the relative position of the displayed menu compared to all of the other settings available in this menu.

13.1 Set Altimeter

The *Set Altimeter* page (Figure 13.2) allows the user to adjusts the barometric altimeter. A barometric altimeter calculates altitude based on atmospheric pressure. Since atmospheric pressure can vary substantially with meteorological conditions it should be calibrated prior to takeoff.

Calibrating the altimeter can be achieved by entering the know altitude of the location. Entering an altitude automatically calculates the QNH. Conversely, if the QNH is changed then the altitude is adjusted accordingly. This method allows calibrating the altimeter by either entering a know altitude at the current location, or known QNH for a particular instant in time at the current location.

Altitude can also be set from the GPS. Below the QNH you will find a *Get from GPS* field which can be set to *Yes No* or *Auto*. Adjusting this value to *Yes* will make the NAV take the altitude from the GPS and adjust the altitude accordingly. The *Yes* is not stored in the setting, since it is a one time only operation.

The *Get from GPS* can also be set to *Auto*, with this value being stored in the settings. When *Auto* is selected, the NAV will automatically set the altimeter to the GPS altitude when the pdop value is lower than the previous one.

Note that *position dilution of precision* (pdop) gives you an indication of how reliable the *GPS* altitude is at the moment. The lower the pdop value the more accurate the position fix.

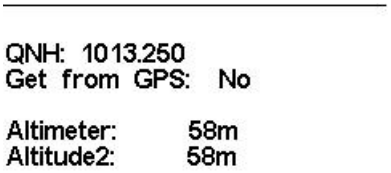

Figure 13.2: Set Altimeter

13.2 Time

The *Time* page allows the user to set the vario integration time, track log parameters, and the Universal Coordinated Time ((UTC) offset). (Figure 13.3)

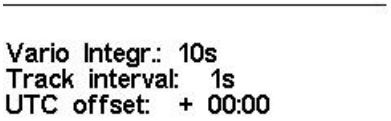

Figure 13.3: Timing Parameters

The current firmware version supports two interval related parameters the *Vario Integrator* and *Track Interval*.

13.2.1 Vario Integrator

The Integrated vario is calculated by integrating the vertical speed during a period of X seconds defined by this value. In the example of Figure 13.3, the integration period is 10 seconds (default value).

13.2.2 Track interval

During flight the NAV stores a track log point every *track interval* seconds. Track recording starts automatically when a speed of 5km/h is exceeded and the NAV has a 3D GPS fix. However, when a task is active the NAV will store a track log point immediately as it enters a turn point cylinder, Goal, or Start open. See Section 10.3 about track log memory capacity.

13.2.3 UTC offset

Using GPS data, the NAV automatically adjusts the internal clock to the Universal Coordinated Time (UTC). The user should adjust the UTC offset so that the time displayed by the NAV matches the local time.

13.3 Vario Acoustics

The user can change the climbing, and sinking rate sound through the respective threshold values. These thresholds correspond to the climbing and sinking rates at which the sound activates. The user can also define in the Acoustic Thresholds option the sink alarm and the sound volume of is the NAV (Figure 13.4).

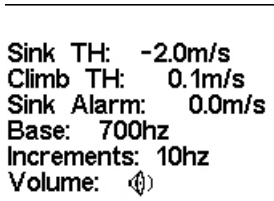

Figure 13.4: Vario Acoustics

13.3.1 Climb Threshold

The *Climb Threshold* defines the rate of climb at which the vario will start beeping. The frequency of the first beep is defined in Base Frequency hz, the sound frequency will become steadily higher with by Increments hz value.

The default value for *Climb Threshold* is 0.1m/s.

13.3.2 Sink Threshold

The *Sink Threshold* is the rate of descent at which the vario will emit a constant low frequency sound. The deeper the sink rate the lower the frequency will sound. Default value for this item is -2 m/s, we suggest setting a value lower than the natural sink rate of the glider when flying with speed bar in still air.

13.3.3 Sink Alarm

The *Sink Alarm* is highlighted when the confirmation of *Climb TH* is made. The *Sink Alarm* defines a vertical speed value at which a sound (alarm siren) starts to be produced. This alarm can be used to identify high vertical speeds, as for example, in a spiral dive. Set the Sink Alarm to 0 to disable the alarm.

13.3.4 Base Frequency

The audio frequencies can be adjusted to match the user's preference, by setting the *Base Frq* and *Increments*.

The *Base Frq* is the first frequency used to produce the initial sound which corresponds to the climb threshold, usually 0.1 m/s. Later, as the climb rate increases, a bip, bip sound is produced for which the cadence, and frequency, also increase. The *Base Frq* can be set from 500 to 1500 Hz. The higher is the frequency value, the higher pitched the sound is.

In order to change the base frequency value press the ENTER key after the *Audio Frequencies* menu option is highlighted. This action will highlight the *Base Frq* value so it can be increased using the UP key, or decreased using the DOWN key. The ENTER key should then be pressed, thus confirming the *Base Frq* setting. The preset value for *Base Frq* is 700 Hz.

13.3.5 Increments

The *Increments* parameter sets the frequency increment for each 0.1 m/s climb rate increase. The *increments* can be set from 1 to 99 Hz. The preset value for *Increments* is 10 Hz.

Considering an *Increments* value of 10, and *Base Frq* of 700 Hz, the vario frequency at 1 m/s is 800 Hz.

13.3.6 Volume

The final option allows the user to adjust the sound volume. In *Flight Mode* the current volume level can be seen using the sound element (see Section 3.1.2 for more details).

The NAV has six different sound levels, plus *no sound*. Pressing UP, or DOWN, keys will respective increase, or decrease the sound level. After setting the sound value , to confirm and return to the Settings menu press the ENTER key.

Note that sound volume can also be adjusted using one FS key. However, changing the volume using an FS key is only valid for the current flight, and will not override the volume level setting. Every time the instrument is turned on, if the sound is muted, an alarm is generated in order to notify the pilot.

13.4 Alerts

In this menu it it possible to set up the instrument to give you audio alerts when certain conditions have been met. There are 4 different alerts that are possible (Figure 13.5).

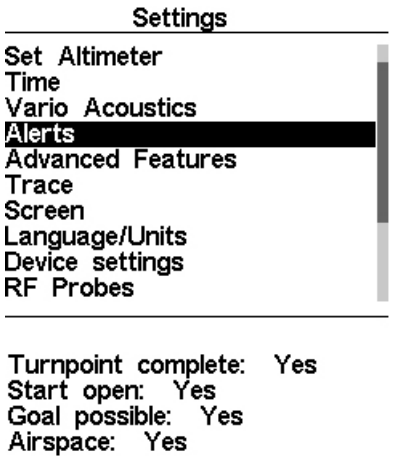

Figure 13.5: Alerts

Each of these alerts can be activated by selecting the YES prompt when the ENTER key is pressed.

13.4.1 Turnpoint Complete

When this function has been set to YES, a brrrr sound is produced when the pilot has successfully crossed a turnpoint (see Turnpoint validation)

13.4.2 Start Open

When this function has been set to YES, a siren type is produced when the start time has elapsed. This tone does not indicate that a successful start has been made, however.

13.4.3 Goal Possible

When this function is set to YES, a brrr sound is made to indicate that it is possible to make GOAL. This is based on having a positive number for altitude above goal. This is calculated based on the average glide ratio and it takes into account wind, day quality and glider performance.

13.4.4 Airspace

When this function is set to YES, a siren type sound is produced indicating that the pilot has entered the buffer zone (see Section 8) close to airspace.

13.5 Advanced Features

The advanced features settings option can be used to set more of the NAV vario acoustics. (Figure 13.6).

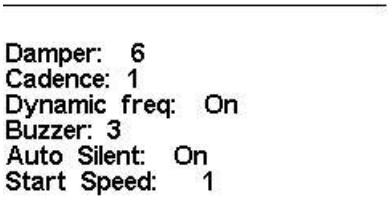

Figure 13.6: Advanced Features

13.5.1 Damper

The NAV 's vertical speed calculation is based on air pressure variations. It is very seldom to have air pressure absolutely stable. Turbulence caused by air moving near the sensor is sufficient to cause small variations in pressure. For this reason the NAV filters (averages) the pressure data to prevent constantly detecting tiny pressure variations. The value that defines how must the pressure is filtered is the *Damper*. Setting a lower damper value caused the NAV to become more responsive but harsher. Inversely a higher value causes the NAV to be less responsive but smoother. We have found that an ideal value is 6 and therefore the default value.

13.5.2 Cadence

When a rate of climb is higher than that specified by the Climb threshold the NAV creates a beeping sound. The rate (cadence) of the beeps increases as the climb rate increases. This increase in rate is not linear. The cadence parameter specifies which cadence curve should be used. Current there are 2 possibilities represented in the graph of Figure 13.7.

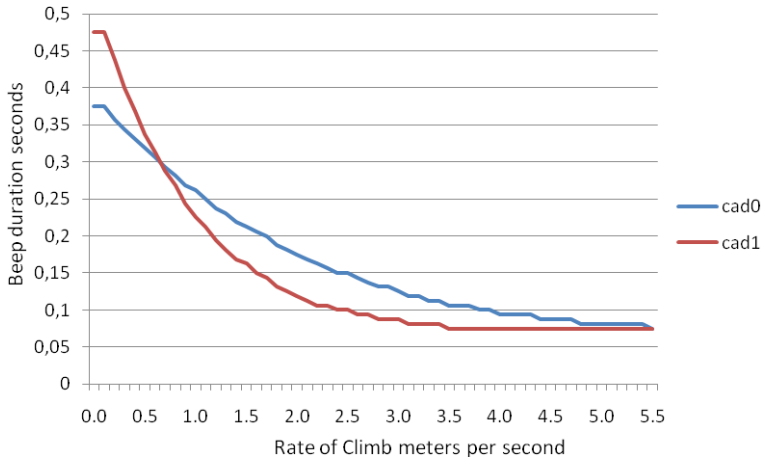

Figure 13.7: Cadence timing

13.5.3 Dynamic Frequency

The NAV beeps at a specified pitch (frequency) when a certain rate of climb is encountered. When dynamic frequency is off, the pitch (frequency) of that beep will remain constant if the rate of climb changes. With dynamic frequency on, the pitch of the beep may vary if the rate of climb varies during the individual beep.

13.5.4 Buzzer

Is so called because of the sound it emits, which resembles a buzzing sound.

The buzzer sound is produced when the rate of climb is close to, but has not yet reached the specified Climb threshold (see 13.3.1). This value is set between 0 and 9 with each unit corresponding to be 0.1 m/s, ie. 3 is 0.3m/s. Subtracting this decimal value from the climb threshold will give us the value at which the NAV will start buzzing. For example with the NAV default values, Climb threshold=0.1m/s, and Buzzer=3 (0.3m/s) the buzzing with start at -0.2m/s because 0.1 - 0.3= -0.2. In this case at 0.1m/s directly below the Climb threshold the NAV will emit a constant sound varying rapidly in pitch from around 100hz to the set base frequency at which the first beep is emitted. This is the buzzer sound and may resemble a growl noise. Setting the Buzzer value to 0 will disable the buzzer feature.

Although the Buzzer will sound very annoying on the ground it becomes an amazing companion in flight allowing the pilot to pick-up thermals he would have usually missed.

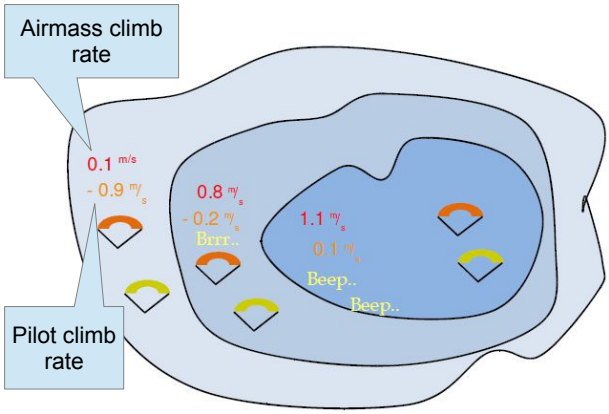

Figure 13.8: Buzzer

A practical example of the advantages of the buzzer feature can be illustrated in Figure 13.8 In this example both pilots are sinking at -1.0 m/s. The orange paraglider has a NAV for which the climbing threshold is set to 0.1 m/s and the Buzzer parameter is set to 3 (0,3 m/s). The green paraglider has a typical vario for which the climbing threshold is set to 0.1 m/s.

As shown in the figure, when both pilots enter the thermal nothing is heard. The air is rising at 0.1 m/s but both pilots are descending at -0.9 m/s. In the second zone of the thermal the air is rising at 0.8 m/s, and so pilots are descending at -0.2 m/s. At this stage the orange pilot starts to hear the Next to Climb brrrrr sound of his NAV , which helps him to centre the thermal, while the green pilot is still unaware of the thermal. Finally, in the 3 zone, the air is rising at 1.2 m/s, and so both pilots climb at 0.2 m/s. The NAV pilot starts to hear his vario beep... beep... sound, it is only at this point the green pilot hears the first beep from his instrument.

The green pilot may have missed the thermal completely had he found the inner zone or if he was not watching his friend with the NAV !

13.5.5 Auto Silent

Setting Auto silent on will keep the NAV 's buzzer quiet until a *start flight* has been detected. The instrument will start flight when a 3D GPS fix is available, the speed exceeds the value defined in the Start Speed and the vario rate of climb/sink exceeds 0.15m/s.

The audio will then be kept active until the NAV is switched off. The default value for the auto silent parameter is *On*.

13.5.6 Start Speed

The *start speed* is used to define the minimum GPS speed, in Km/h, that should be reached in order to initiate the flight. Note that the start flight event is important to many other functionalities, so care should be taken when setting this value. For example, if Auto Silent is on, the vario will only beep after the flight starts. The track data is also only saved after the flight starts.

13.6 Trace

This option sets the behaviour of the traces drawn on the Map view.

13.6.1 Enabled

Setting this option to yes will draw traces on the Task Map, setting *no* a trace will not be drawn.

13.6.2 Auto Zoom

Setting *Yes* causes the system to automatically zoom into the trace when entering a thermal, making it easy to understand the location of the thermal.

13.6.3 Grey lines

Set *Yes* the trace lines in lift will be drawn in black while the sink will be drawn in grey. Conversely *No* all the trace lines will be drawn in black.

13.6.4 Track up

Track up allows the trace to be displayed with either the track relative to North (track up off) Figure 13.9 or with the current heading to the top of the screen Figure 13.10.

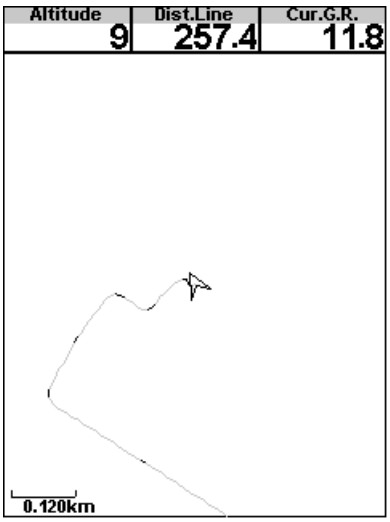

Figure 13.9: Track Up Off

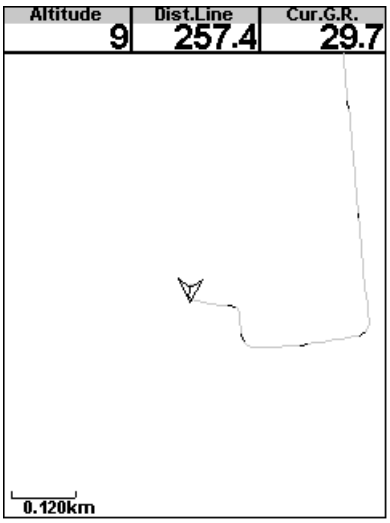

Figure 13.10: Track Up On

13.7 Screen

The screen menu option allows the user to set the Screen contrast to Enable/Disable the pages triggers, and to colour-invert the titles (Figure 13.11).

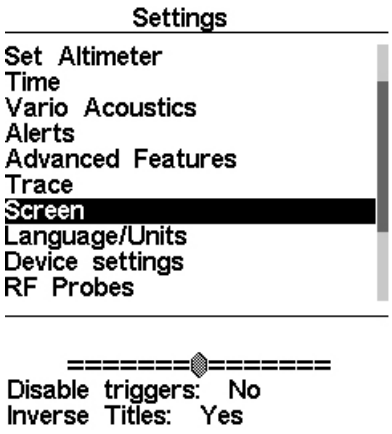

Figure 13.11: Screen Settings

13.7.1 Screen Contrast

Contrast may be adjusted to the pilot's needs. Beware of adjusting a very low value may cause the display to be totally blank. With a blank screen it is difficult to readjust since nothing is visible.

You can use the UP, and DOWN keys, to move the contrast bar (Figure 13.11). Move the bar to the right to increase the contrast, and to the left to decrease the contrast. When in the desired position push the ENTER key to confirm the value.

13.7.2 Disable Triggers

Page event triggers are a important unique feature of the NAV .

Pages can be automatically activated during flight by defining a trigger event for the page. These triggers are set using the Flymaster DESIGNER program. See the DESIGNER manual for details. Using the triggers, the user can view different pages according to different flight contexts. These can be automatically activated (switched) if a certain condition is met. One good example is an airspace control page. In an airspace control page the user can view the airspaces map, as well as different airspaces related data fields (eg. Distance to CTR). Additionally, the trigger *Airspace Warning* can be set to this page. During flight the user can have any page active, for example a thermal page. However, if an airspace limit is reached the device will automatic change the page to airspaces one. Each device has its own trigger events. The current available triggers for the NAV are show in Table 13.1.

This menu can be used to disable all the page triggers at once. In order to disable page triggers the *Disable Triggers* option should be set to *Yes*, using the UP, or DOWN keys, and confirmed with the ENTER Key.

13.8 Inverse Titles

Inverse titles allows the user to change the background of the titles as illustrated in Figure 13.12.

Table 13.1: Page Triggers Events

Event	*Description*
Airspace Warning	This event occurs when the horizontal, or vertical distance to an airspace is less then the respective thresholds.
Entering Thermal	This event occurs when the pilot enters in a thermal.
Transition	This event occurs when the pilot enters leaves a thermal and starts a transition.
Arriving at Turnpoint	This event occurs when the pilot is arriving at less than 1km away from the turnpoint
Start Opened	This event occurs immediately after the start time.
Power Up	This event is triggered when the instrument is powered up.

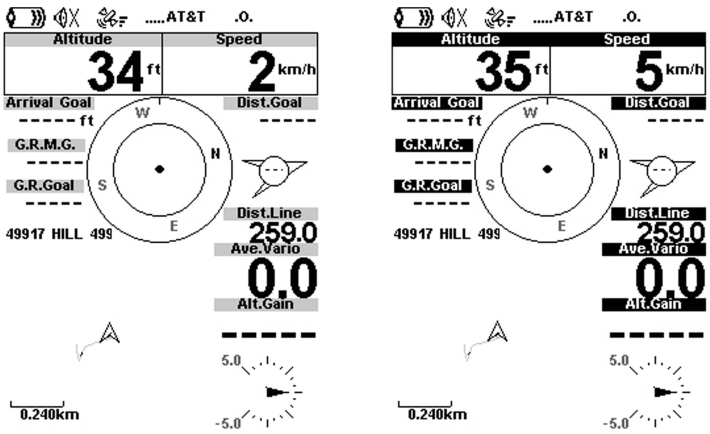

Figure 13.12: Inverse Titles

The figure of the left shows the normal display and that on the right shows the same display with inverse titles set to *Yes*.

13.9 Language/Units

The *Language and Units* menu option allows the user to change the NAV interface language and units. A short description off the available options for this menu are shown in Table 13.2.

The UP, and DOWN keys, can be used to change each field option. Pushing the ENTER key confirms the current field value, and highlights the following field. Pushing, the MENU key will undo changes.

Table 13.2: Language/Units Menu Options

Function	**Description**
Language	Defines the interface language.
Alti. Units	Altitude Units. Altitude can be show in Meters, or Feet.
Roc. Units	Rate of Climb Units. ROC can be show in m/s, or 10 x Feet/ min

Continued on next page

Table 13.2– continued from previous page

Field ID	Description
Dist. Units	Distance units can be in Km, or Miles.
Speed Units	Speed Units can be in Km/h, Miles/h, or Knots.
Temperature	Temperature units can be Celsius or Farenheit.
Coords.	Coordinates format. These can be either: • DD°MM'SS? • DD°MM.mmm' • DD.dddd • UTM

13.10 Device Settings

This menu option allows the user to reset all parameters to the default factory values. This will not change the layout to the factory default layout. Care should be taken because all changes made by the user are lost. In order to reset all settings use UP, or DOWN key to change the *Factory Settings* parameter to *Yes*, and then confirm the action with the ENTER key.

Additionally this menu also allows to make an hardware reset to the instrument. The result is the same as the one presented in Section 1.5. In order to reset the instrument use UP, or DOWN key to change the *Reset Now* parameter to *Yes*, and then confirm the action with the ENTER key.

13.11 RF Probes

The *RF Probes* menu option allows the user to pair up any of the Flymaster wireless devices including the M1 and Heart-G to the NAV . Pairing is performed automatically. The NAV will look to see what wireless devices are around and it will shows these on the screen (Figure 13.13).

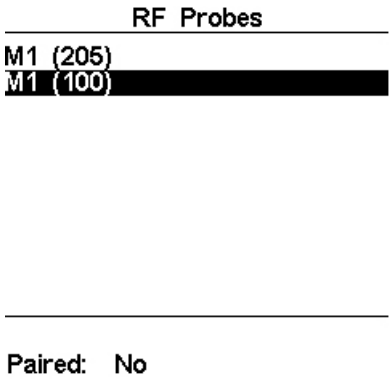

Figure 13.13: RF probes

In the example shown in Figure 13.13, two M1 devices are visible. These are distinguished on the screen by showing their serial number. (The serial number for the device can be found on the back of the wireless device). By selecting one of the M1 devices and selecting ENTER, the option to pair that device becomes available. Once paired the NAV will aways pair with that same wireless device.

13.12 Heart-G

Entering the Heart-G menu allows the user to set a Pulse Threshold above which the pulse data field will toggle between inverted numerical display and normal numerical display. This allows the user to quickly see that they have a pulse above the desired level. To change the threshold value for the Pulse, selecting ENTER and then pressing the up or down keys allows this value to be changed. Figure 13.14 shows the Heart-G menu.

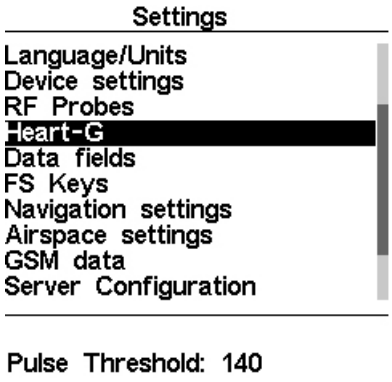

Figure 13.14: Heart-G settings

13.13 Data fields

The NAV has 6 user defined fields (UDF) which the pilot can configure for his own needs using this menu. UDF's are numbered from 1 to 6. A description of available data Fields can be found in Section 3.2. If UDF data fields are set up in the current layout, then this menu can be used to defined which data fields are shown in each of the 6 UDF's (Figure 13.15).

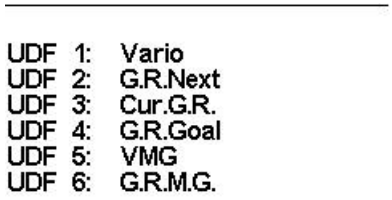

Figure 13.15: User Defined Fields

Entering this menu automatically moves the user to UDF 1. By pressing either the UP or DOWN keys, the user can select which data field is displayed. Pressing ENTER, will toggle to the next UDF. When all six UDFs have been set, pressing ENTER will save the settings.

13.14 FS Keys

In Flight Mode keys UP, DOWN, and ENTER can have user defined functions which provides shortcuts to certain functions. This menu allows the user to associate a function with a button.

The functions in Table 13.3 can be allocated to the FS keys.

Table 13.3: Function Key descriptions

Function	Description
Set Volume	Allows changing volume settings.
Switch Page	Allows changing the Layout Page.
Set Altimeter	Allows user to set Altimeter
Task Navigator	Jumps from flight page directly into Task Navigator page.
Reset A2	Sets altimeter 2 to zero.
Airfields	Jumps from flight page directly into Near Airfields page.

13.15 Navigation Settings

In this menu, several of the navigation settings can be adjusted (Figure. 67).

13.15.1 Safety Margin

The pilot can chose the safety margin they wish to use for any of the horizontal distances. Using a setting of 8m, (as shown in Figure. 67) would mean that in the case of a waypoint cylinder, a pilot would be 8 m deeper into the cylinder to ensure that it had been tagged and recorded. For airspace, they would trigger the buffer zone being 8m further away. The size of the safety margin can be changed by scrolling through the numbers using the UP and DOWN keys. Pressing ENTER moves to the next digit.

13.15.2 Turnpoint Size

The default turnpoint cylinder size is set in this menu. The size of the cylinder can be changed by scrolling through the numbers using the UP and DOWN keys. Pressing ENTER moves to the next digit. This value is used as the default cylinder size during task creation (see Section 5.2).

13.15.3 Datum

Different datum models can be set on the NAV . Options available are WGS 84 and FAI sphere. At the start of any competition, be sure to check what Datum is used by the scoring system to ensure that the correct distances are being reported.

13.16 Airspace settings

This menu allows the user to define certain parameters related with airspace. Each of the parameters can be changed using UP, and DOWN, keys. Pressing the ENTER key confirms the value and jumps to next parameter. Changes can be undone by pressing the MENU key.

As shown in Figure 13.16 there are 5 parameters related to the airspace.

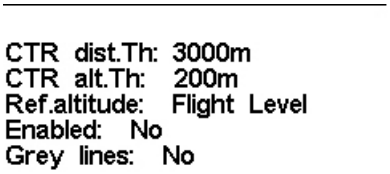

Figure 13.16: Airspace Settings

The *CTR dist. Th*, and *CTR alt. Th*, are the minimum horizontal distance, and minimum vertical distance respectively, that a pilot can be from an airspace without triggering an airspace warning. If this threshold is passed a warning is emitted (event).

The *Ref. Altitude* parameter allows the user to define the altitude that is used to evaluate the airspace's proximity. The parameter can be set to: GPS Altitude / Altitude given by the GPS, Altitude / Barometric altitude, Flight Level ? Altitude considered standard pressure value (1013 hPa) for the QNH.

The Enabled parameter allows the user to enable airspace?s warnings, or disable them, by setting the value to YES, or NO respectively. If this parameter is set to YES, when a pilot is inside an airspace area (as shown in a 2D representation, but not necessarily inside the airspace), the airspace is drawn in black. In this case all other airspaces are drawn in grey.

Chapter 14

Firmware

Flymaster follows a policy of continuous improvement of its products. This means that a new version of firmware can be uploaded from our website periodically. The update process is simple.

Before beginning update procedure make sure you download the next files from the download page of NAV product section:

- USB Drivers according the operating system (Windows, windows 7 64bits or MAC OS X)
- The last version of the firmware (xxxFirmware.fmf)
- The firmware updating software according the operating system (Flymaster Firmware Install).

The first step of the updating procedure consists in installing the USB drivers. In order to do that you should run the drivers installation file and follow the on-screen instructions.

Next you need to install the update application, run the Flymaster firmware installer setup and follow the on-screen instructions.

Once the driver and the update tool are correctly installed do the following procedure.

1. Double click the firmware file, this will start the Flymaster Firmware installer, with the firmware path already inserted. Alternatively, open the Firmware installer, and insert the path to the firmware file. (Figure 14.1)
2. Click *Send Firmware* button. The message *waiting for Flymaster instrument...* will appear.
3. Connect the NAV to the PC using the cable supplied. If it is the first time the NAV is connected to the PC, wait until Windows show the message that new hardware is present and ready to use.
4. The update should start automatic, and a message appears saying *Programing...*, and a progress bar starts to grow. If after a few seconds nothing happens reset the NAV (click at the same time the Menu and down arrow key for 2 seconds (see section 3.5)). When the process is finish the application shows a message saying *complete*. Then disconnect the USB cable and the NAV will start to work.

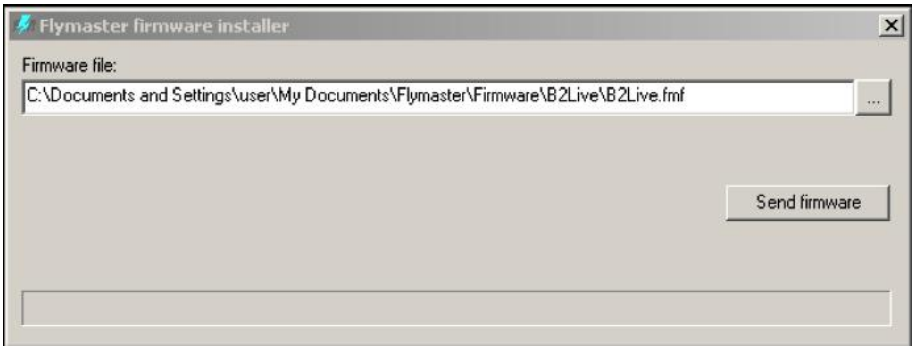

Figure 14.1: Firmware Update

Chapter 15

Interfacing with GPSDump

With the Flymaster GPS it is possible to download tracks and upload waypoints using the GPS-Dump interface. GPSDump is freeware that can be downloaded to your MAC or PC. This section will describe how to use the GPSDump interface. It is assumed that the correct drivers have been installed on the computer and that GPSDump has been installed.

15.1 Configuring GPSDump

Before you can start interfacing your Flymaster GPS unit with your computer, you must first make sure that you have set the correct COM port on GPSDump. Connect your instrument to the computer and make sure both are switched on. In the GPSDump menu, select the drop down menu under MISC as shown in Figure 15.1 below.

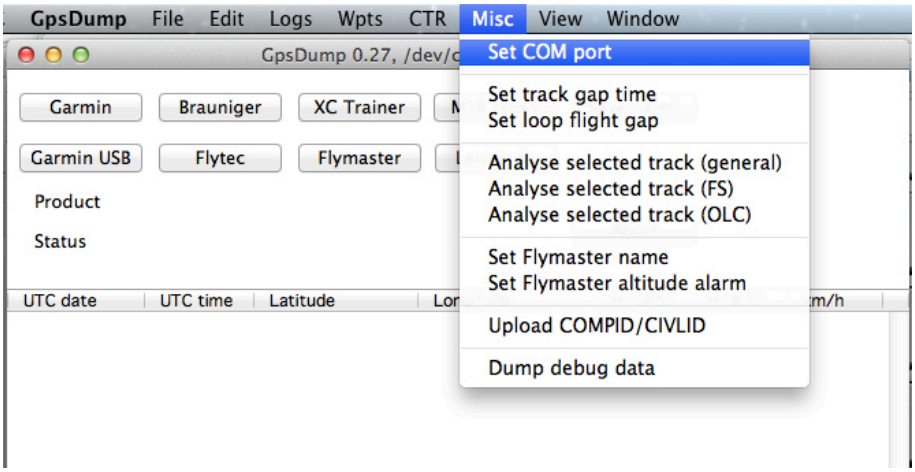

Figure 15.1: Setting up COM port

On a MAC when you select COM port you should get a screen like this: Figure 15.2

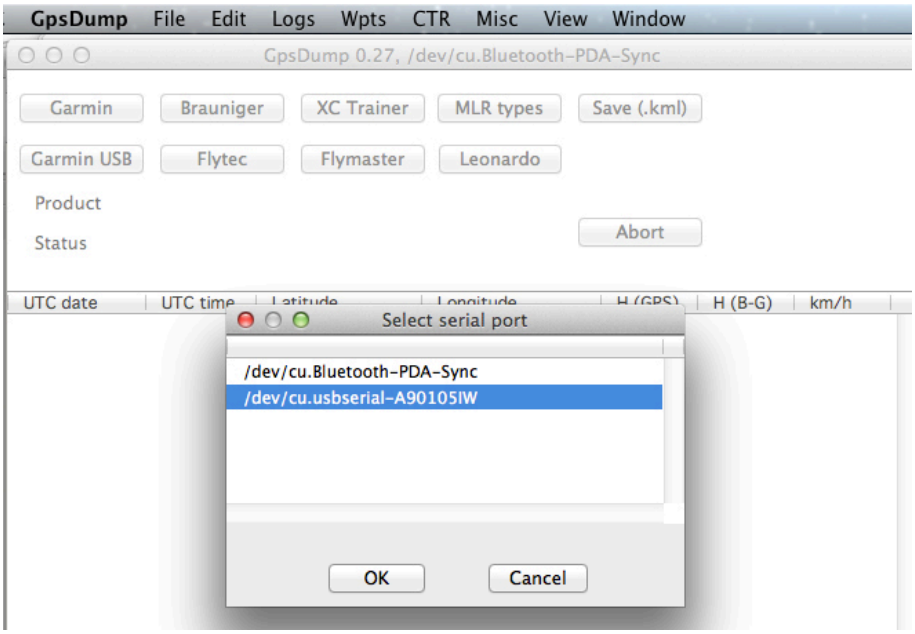

Figure 15.2: COM port options

Make sure you select the USBserial port as shown above.

On a PC when you select COM port a smaller dialogue box pops up listing all of the COM ports that are currently interfacing with the instrument. Flymaster instruments typically populate with high COM port numbers such as COM 11 in the example below Figure 15.3.

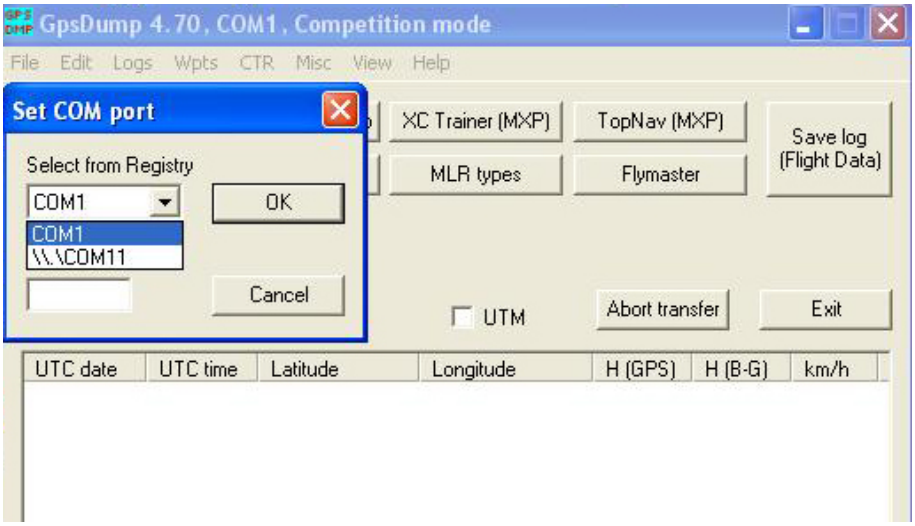

Figure 15.3: COM port options

Once the COM ports have been configured you should be good to go.

15.2 Uploading Waypoints

To upload waypoints, open the waypoint file in GPSDump. Your screen should like this Figure 15.4.

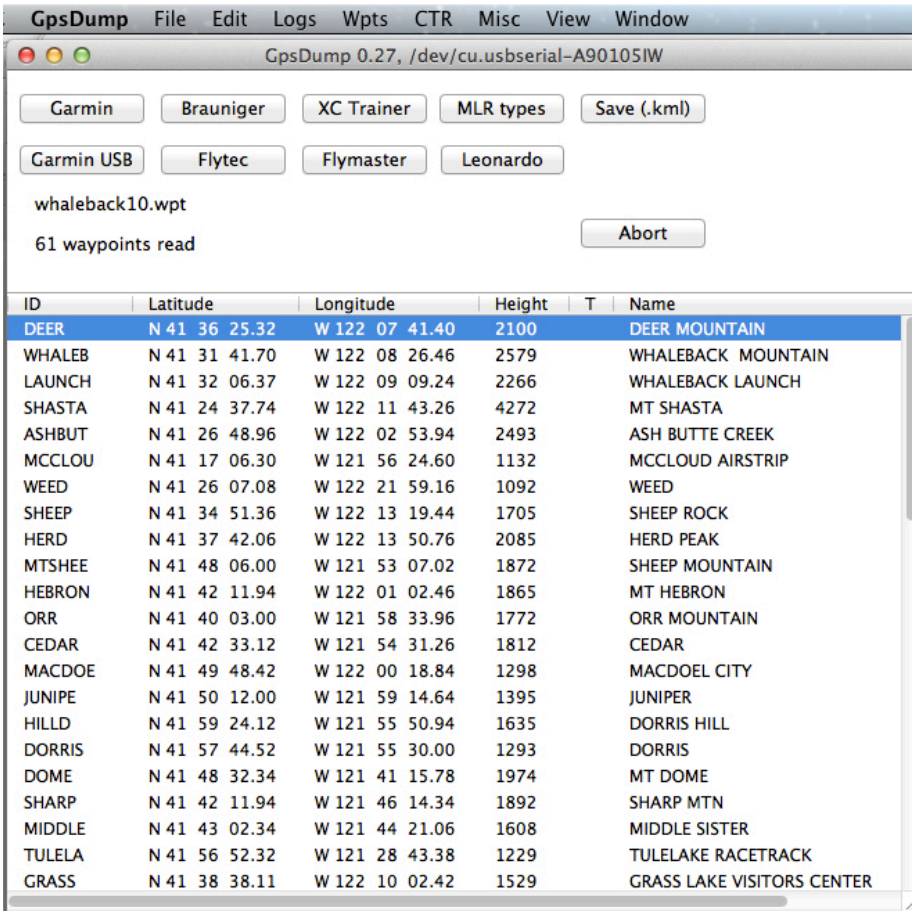
GpsDump File Edit Logs Wpts CTR Misc View Window
GpsDump 0.27, /dev/cu.usbserial-A90105IW
Garmin
Brauniger
XC Trainer
MLR types
Save (.kml)
Garmin USB
Flytec
Flymaster
Leonardo
whaleback10.wpt
61 waypoints read
Abort
ID Latitude Longitude Height T Name
DEER N 41 36 25.32 W 122 07 41.40 2100 DEER MOUNTAIN
WHALEB N 41 31 41.70 W 122 08 26.46 2579 WHALEBACK MOUNTAIN
LAUNCH N 41 32 06.37 W 122 09 09.24 2266 WHALEBACK LAUNCH
SHASTA N 41 24 37.74 W 122 11 43.26 4272 MT SHASTA
ASHBUT N 41 26 48.96 W 122 02 53.94 2493 ASH BUTTE CREEK
MCCLOU N 41 17 06.30 W 121 56 24.60 1132 MCCLOUD AIRSTRIP
WEED N 41 26 07.08 W 122 21 59.16 1092 WEED
SHEEP N 41 34 51.36 W 122 13 19.44 1705 SHEEP ROCK
HERD N 41 37 42.06 W 122 13 50.76 2085 HERD PEAK
MTSHEE N 41 48 06.00 W 121 53 07.02 1872 SHEEP MOUNTAIN
HEBRON N 41 42 11.94 W 122 01 02.46 1865 MT HEBRON
ORR N 41 40 03.00 W 121 58 33.96 1772 ORR MOUNTAIN
CEDAR N 41 42 33.12 W 121 54 31.26 1812 CEDAR
MACDOE N 41 49 48.42 W 122 00 18.84 1298 MACDOEL CITY
JUNIPE N 41 50 12.00 W 121 59 14.64 1395 JUNIPER
HILLD N 41 59 24.12 W 121 55 50.94 1635 DORRIS HILL
DORRIS N 41 57 44.52 W 121 55 30.00 1293 DORRIS
DOME N 41 48 32.34 W 121 41 15.78 1974 MT DOME
SHARP N 41 42 11.94 W 121 46 14.34 1892 SHARP MTN
MIDDLE N 41 43 02.34 W 121 44 21.06 1608 MIDDLE SISTER
TULELA N 41 56 52.32 W 121 28 43.38 1229 TULELAKE RACETRACK
GRASS N 41 38 38.11 W 122 10 02.42 1529 GRASS LAKE VISITORS CENTER

Figure 15.4: Waypoint list

Once the file has been opened, select alll of the waypoints (COMMAND A in MAC and CONTROL A for PC).

In the drop down menu for WPTS you should see the following options (Figure 15.5).

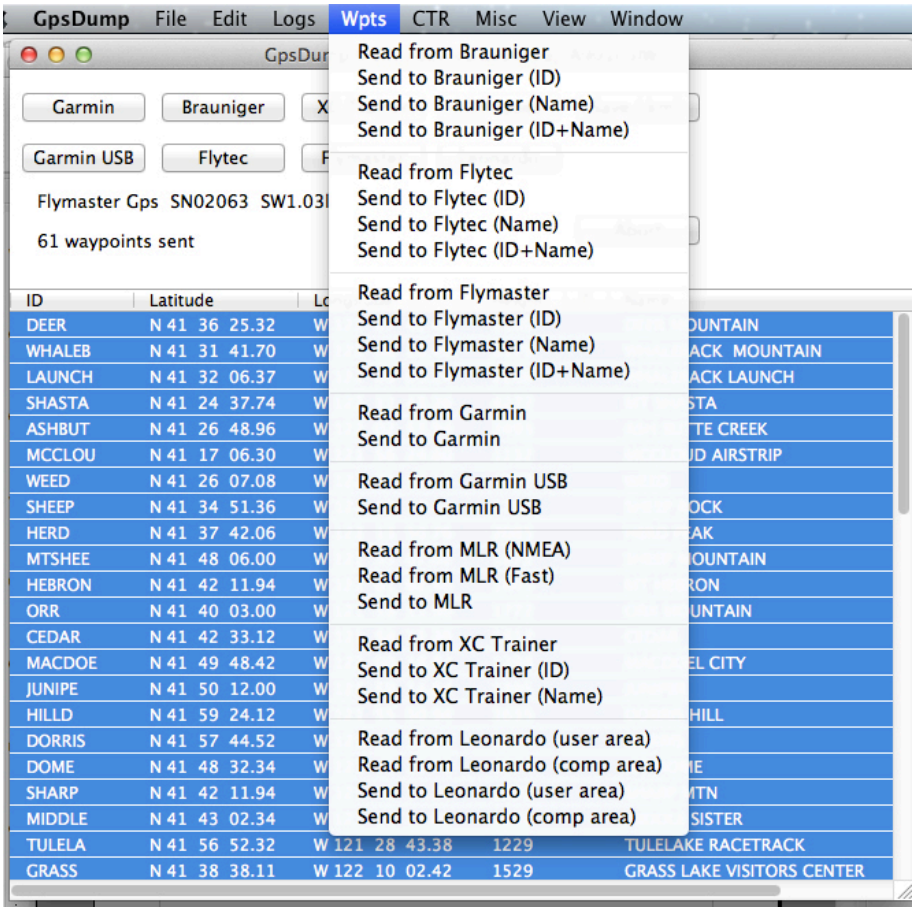

Figure 15.5: Waypoint options

Here you have the option of sending the waypoint ID, or the waypoint name or both. Once you select the type of waypoints to send you should see the the waypoints being sent to the instrument.

15.3 Downloading tracklogs

To download a track simply click on the FLYMASTER button on GPSDump.

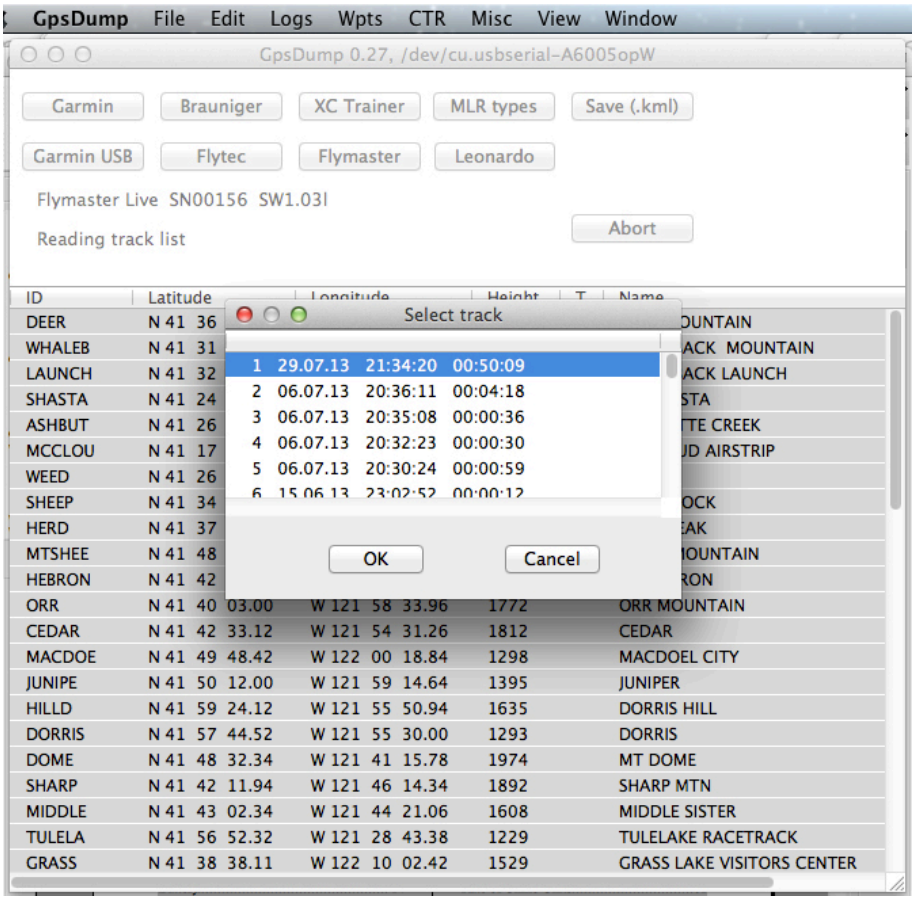
GpsDump File Edit Logs Wpts CTR Misc View Window
GpsDump 0.27, /dev/cu.usbserial-A6005opW
Garmin
Brauniger
XC Trainer
MLR types
Save (.kml)
Garmin USB
Flytec
Flymaster
Leonardo
Flymaster Live SN00156 SW1.03l
Reading track list
Abort
Select track
1 29.07.13 21:34:20 00:50:09
2 06.07.13 20:36:11 00:04:18
3 06.07.13 20:35:08 00:00:36
4 06.07.13 20:32:23 00:00:30
5 06.07.13 20:30:24 00:00:59
OK
Cancel
ID Latitude
DEER N 41 36
WHALEB N 41 31
LAUNCH N 41 32
SHASTA N 41 24
ASHBUT N 41 26
MCCLOU N 41 17
WEED N 41 26
SHEEP N 41 34
HERD N 41 37
MTSHEE N 41 48
HEBRON N 41 42
ORR N 41 40 03.00 W 121 58 33.96 1772 ORR MOUNTAIN
CEDAR N 41 42 33.12 W 121 54 31.26 1812 CEDAR
MACDOE N 41 49 48.42 W 122 00 18.84 1298 MACDOEL CITY
JUNIPE N 41 50 12.00 W 121 59 14.64 1395 JUNIPER
HILLD N 41 59 24.12 W 121 55 50.94 1635 DORRIS HILL
DORRIS N 41 57 44.52 W 121 55 30.00 1293 DORRIS
DOME N 41 48 32.34 W 121 41 15.78 1974 MT DOME
SHARP N 41 42 11.94 W 121 46 14.34 1892 SHARP MTN
MIDDLE N 41 43 02.34 W 121 44 21.06 1608 MIDDLE SISTER
TULELA N 41 56 52.32 W 121 28 43.38 1229 TULELAKE RACETRACK
GRASS N 41 38 38.11 W 122 10 02.42 1529 GRASS LAKE VISITORS CENTER

Figure 15.6: Downloading tracklog

When you click on the Flymaster button a list will populate showing all of the flight logs on the instrument (Figure 15.7).

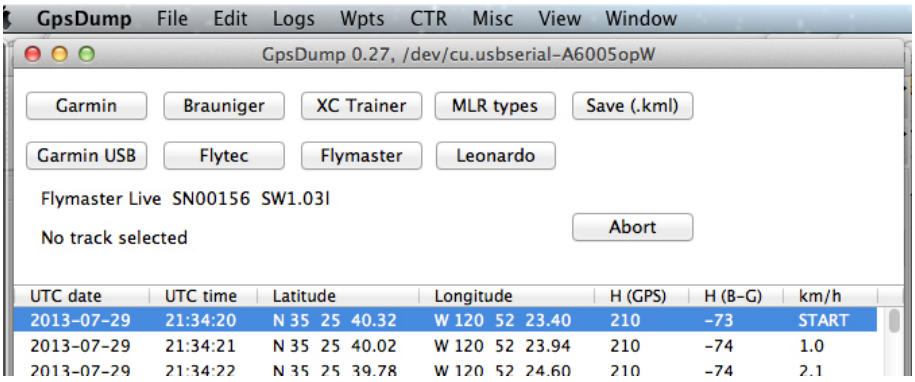
GpsDump File Edit Logs Wpts CTR Misc View Window
GpsDump 0.27, /dev/cu.usbserial-A6005opW
Garmin
Brauniger
XC Trainer
MLR types
Save (.kml)
Garmin USB
Flytec
Flymaster
Leonardo
Flymaster Live SN00156 SW1.03l
No track selected
Abort
UTC date UTC time Latitude Longitude H (GPS) H (B-G) km/h
2013-07-29 21:34:20 N 35 25 40.32 W 120 52 23.40 210 -73 START
2013-07-29 21:34:21 N 35 25 40.02 W 120 52 23.94 210 -74 1.0

Figure 15.7: Tracklog list

Simply clicking on the desired flight will download the tracklog to the computer. Once the tracklog has been downloaded it is possible to save the tracklog in several different formats: IGC, KML, and GPX. KML is the recommended format if you wish to view on Google Earth.